

# modern machine shop

MARCH 1961

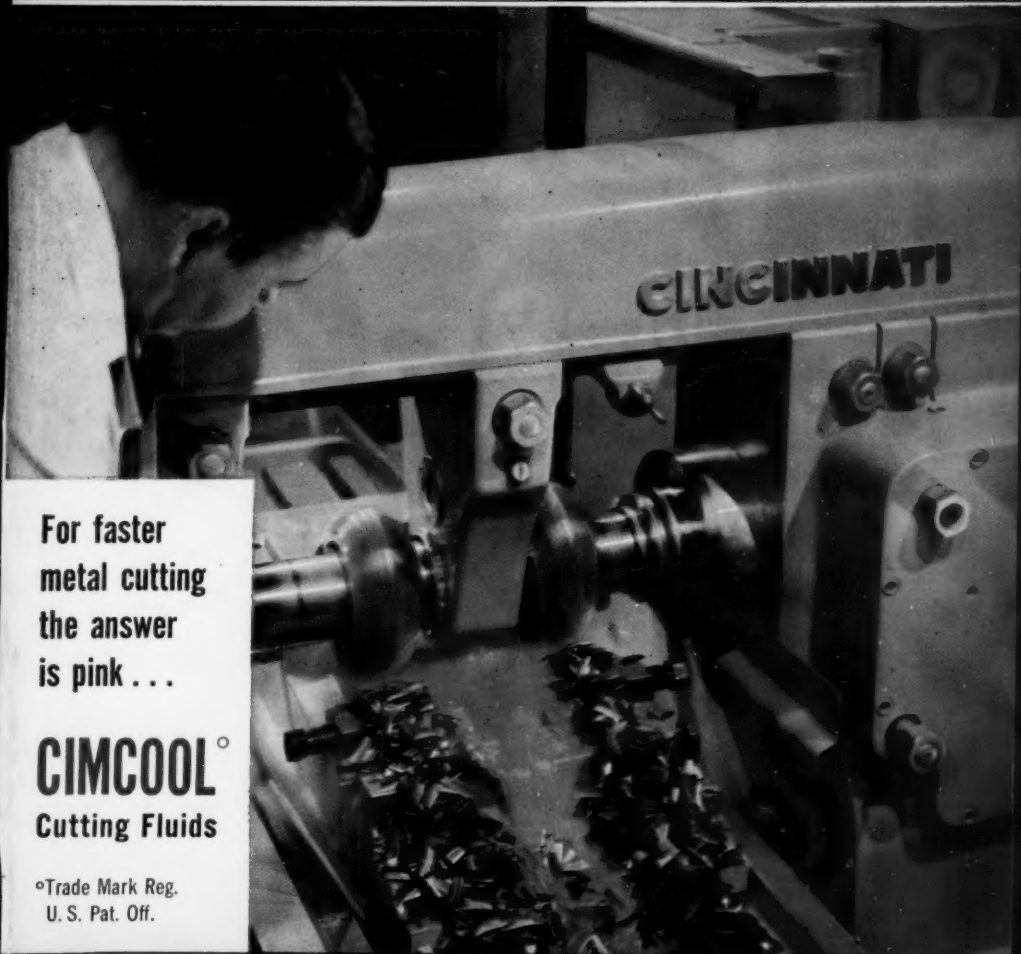
MACHINING  
ALUMINUM ALLOY  
PARTS

See Page 100

WESTERN METAL  
SHOW

See Page 132

The MAGAZINE for PRODUCTION EXECUTIVES in METALWORKING PLANTS



For faster  
metal cutting  
the answer  
is pink . . .

**CIMCOOL<sup>®</sup>**  
Cutting Fluids

®Trade Mark Reg.  
U. S. Pat. Off.

Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio

## *for Plastic Tooling*

**Look!**

Permits use of **slip renewable bushings** in plastic tooling — without the problem of locating lockscrews. Makes liner installation easy as potting a bushing. Saves time and labor.

the New UN-A-LOK LINER®



**POTTING** American gives you a choice of five special bushing designs for potting or cast-in-place installation. Can't twist or spin out.

**PRESSING** American's Serr-A-Grip presses into soft materials, such as aluminum, magnesium, nasonite and others. Once in, it grips like a vise!

For fast, trouble-free installation be sure to specify American. Our FREE catalogs make it easy to order from your local American distributor. For complete information on American drill bushings for plastic tooling, write today.

**DRILL BUSHING CO., 5107 PACIFIC BLVD. LOS ANGELES 58, CALIFORNIA**  
TELEPHONE LUdlow 3-1122 TWX 1315—FAX LOS ANGELES



-A. S. A. and American Standard Sizes

#### BUSHINGS FOR PLASTIC TOOLING



**For more data circle 302 on Postpaid Card**



Fred W. Vogel, Editor  
 Robert I. Shore, Managing Editor  
 L. L. Baldhoff, New Equipment Editor  
 M. C. Due, Editorial Assistant  
 Gilbert C. Close, Field Editor  
 Alfred M. Cooper, Consulting Editor  
 Norman S. Rogers, Art Editor  
 Howard Campbell, Editor Emeritus  
 M. L. Forney, Publisher  
 Richard S. Kline, General Manager  
 K. M. Gettelman, Circulation Manager

# modern machine shop

content

For  
Production  
Executives

Vol. 33, No. 10, March, 1961

## FEATURES IN THIS ISSUE:

<b>Drilling</b>	PRODUCING ALUMINUM ALLOY PISTONS.....	100
	By Cy La Tour	
<b>Routing</b>	ROUTING NON-FERROUS AIRCRAFT PARTS.....	104
	By H. F. Robinson	
<b>Welding</b>	MANUFACTURER REVERSES IMPORT TREND.....	108
	By Bartlett West	
<b>Cleaning</b>	CLEANING TURBOCHARGER PARTS.....	112
	By Gilbert C. Close	
<b>Management</b>	EXPANDING WORKING CAPITAL IN INDUSTRY.....	116
	By Theodore H. Silbert	
<b>Die Design</b>	DESIGN FOR A HUB-PRODUCING DIE.....	124
	By Russell S. Kindt	
<b>Jigs</b>	FOOLPROOF THAT JIG OR FIXTURE.....	128
	By Harold Sedlik	
<b>Trade Show</b>	"IDEA CENTER FOR INDUSTRY WEST".....	132
<b>Numerical Control</b>	MACHINE DRILLS HOLES IN STRUCTURAL COMPONENTS.....	136
<b>Turning</b>	MACHINING LARGE GEAR BLANKS AUTOMATICALLY.....	140
<b>Tracer Control</b>	TRACING SIMPLIFIES 12-FOOT DIAMETER MACHINING JOBS.....	140
<b>Fly Cutting</b>	COMBINATION FLY CUTTING AND BORE-REAMING SETUP.....	141
<b>Carbide Tooling</b>	CARBIDE TOOLS USED TO MACHINE STEERING CYLINDERS.....	142
<b>Straightening</b>	HOW TO STRAIGHTEN A BOWED SHAFT.....	146
	By L. Kasper	
<b>Grinding</b>	PAIRED GRINDING WHEELS SOLVE BREAKDOWN PROBLEM.....	146
	By H. J. Gerber	
<b>Tool Design</b>	NEW TOOL MADE FROM WORN PLIERS.....	148
	By Robert Hill	

## DEPARTMENTS:

IMPORTANT MEETING DATES..	64	IDEAS FROM READERS.....	146
ADVERTISING REPRESENTATIVES	85	FREE LITERATURE.....	150
OVER THE EDITOR'S DESK.....	86	NEWS OF THE INDUSTRY.....	178
REPORT FROM WASHINGTON..	90	NEW EQUIPMENT.....	192
SUPERVISORY PROBLEMS.....	96	WHERE TO GET IT.....	294
MORE PRODUCTION.....	140	INDEX TO ADVERTISEMENTS.	302



Member



### A Statement of Policy

The principal function of MODERN MACHINE SHOP is to search out and disseminate the best and newest ideas for the advancement of engineering skill and mechanical efficiency in the metalworking industry, and neither effort nor expense is spared in the performance of this task.

Published monthly by Gardner Publications, Inc., 431 Main St., Cincinnati 2, Ohio.  
 Printed in the U.S.A.

© 1961 By Gardner Publications, Inc.

# FEATURES

MARCH 1961

## PRODUCING ALUMINUM ALLOY PISTONS

**By Cy La Tour**

This article depicts the various machining and inspection operations performed at Forgedtrue Piston Corporation, Pasadena, California, in manufacturing 100 percent virgin nickel base aluminum alloy pistons.



**Page 100**

## ROUTING NON-FERROUS AIRCRAFT PARTS

**By H. F. Robinson**

Survey shows that precision routers can successfully compete with large automatic equipment in some types of production work.

**Page 104**

## MANUFACTURER REVERSES IMPORT TREND

**By Bartlett West**

Airline Welding officials say "Build a better machine and the world will seek out a pathway to your door."

**Page 108**

## CLEANING TURBOCHARGER PARTS

**By Gilbert C. Close**

Plant engineered setup proves highly efficient for the thorough cleaning of all diesel engine turbocharger parts prior to assembly.

**Page 112**

## EXPANDING WORKING CAPITAL IN INDUSTRY

**By Theodore H. Silbert**

The role of commercial finance companies in furnishing working funds for all constructive business purposes is discussed in detail.

**Page 116**

# in this issue

VOL. 33 NO. 10

modern machine shop

## DESIGN FOR A HUB-PRODUCING DIE

**By Russell S. Kindt**

Discussion covers construction and operating details of a compound die designed for producing a mechanical toy wheel hub.

**Page 124**

## FOOLPROOF THAT JIG OR FIXTURE

**By Harold Sedlik**

Foolproofing such tools through certain design features will reduce the possibility of scrap, thus providing for a substantial saving.

**Page 128**

## "IDEA CENTER FOR INDUSTRY WEST"

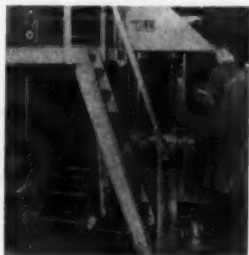
The American Society for Metals will hold its 12th Western Metal Congress and Exposition in Los Angeles, March 20-24.

**Page 132**

## NUMERICALLY CONTROLLED MACHINE DRILLS HOLES IN STRUCTURAL COMPONENTS

A numerically controlled beam and column drilling machine now in operation at the R. C. Mahon Structural Division, Detroit, has drastically cut the cost of fabricating a steel structure for an Ohio River bridge.

**Page 136**



## MORE PRODUCTION THROUGH MODERNIZATION

Methods for increasing production, involving such operations as turning, tracer control, fly cutting, and bore-reaming, are described and illustrated.

**Page 140**

# coarse threads tapped at lower cost



A LANDIS ALT Collapsible Tap produces coarse pitch threads in less than a minute in one pass on a rotating bronze coupling part at the Holys Mfg. Co., Forest Park, Ill.

This installation is an example of the "money-saving" potential of LANDIS Taps. Their ability to tap at one pass large diameter coarse pitch threads requiring heavy metal removal in brass or steel reduces threading time. In addition, LANDIS Precision Tap Chasers produce a maximum number of pieces between grinds to further reduce "per piece" cost.

Various sizes of ALT Taps are available for threading all diameters from 1 1/4" to 13 1/4". Write for Bulletin G-94 for further information.

---

## JOB SPECIFICATIONS

Material: SAE 63 naval bronze casting

Thread Specifications:

Diameter	4.640"
Length	4 1/4"
Type	4 pitch modified square

Equipment: LANDIS 5ALT Tap with 4 1/2" tap head on a No. 5 Gisholt turret lathe

525

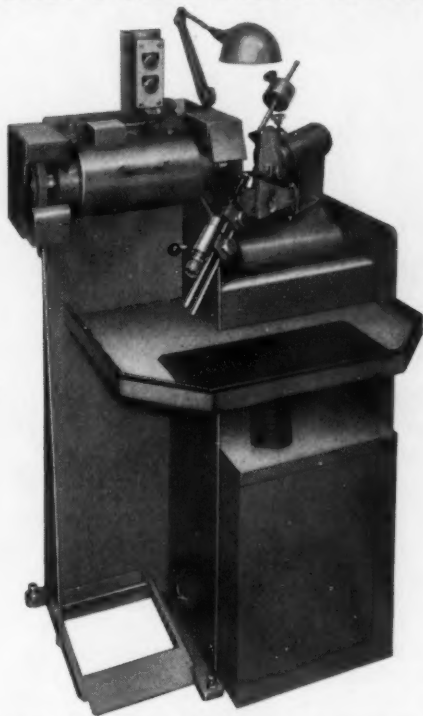
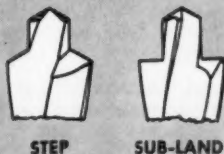
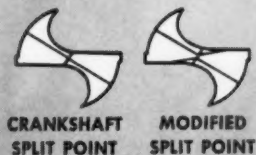
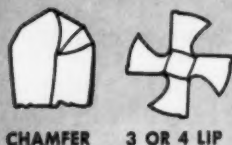
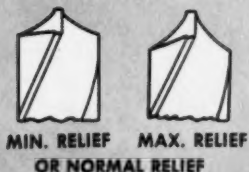
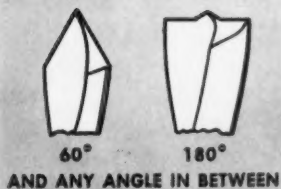
**LANDIS Machine COMPANY**

WAYNESBORO  
PENNSYLVANIA

For more data circle 310 on Postpaid Card

Set-up changes in seconds with the...

## NEW *Hammond* MULTI-POINT DRILL GRINDER



NOW accurate grinding, simple adjustments, quick set-ups, and wide variety drill pointing can ALL be yours. Investigate the many distinctive, money saving features of this new, superior Hammond Drill Grinder. Request Bulletin 711 today.

*Hammond Machinery Builders*  
INC.

1615 DOUGLAS AVE. KALAMAZOO, MICHIGAN

See us at the ATME Show, May 22-26, New York Coliseum.

For more data circle 311 on Postpaid Card

# FREE



## Honing Computer

Tell at a glance how fast you can finish bores with a

## FULMER HONING MACHINE

Simple as A-B-C. Merely set  
Diameter — Length — Material  
Read off: HONING TIME!

Computer also shows much other useful data on speeds, stones, etc.

**A**NYPONE who uses honing needs this handy computer. Anyone who does bore finishing by any method owes it to himself to check up on the actual, positive savings in time, labor and equipment capacity with Fulmer Honing Equipment.

Fulmer Honing Machines cost as little as half the price of other makes . . . equal or exceed them in rate of stock removal, accu-

racy, ease of operation and set-up. Vital parts . . . such as bearings and gears . . . are engineered with 100-plus safety factor to stand up under 3-shift, 7-day service for years.

Write today, on company letterhead, for your FREE Fulmer Honing Computer and Bulletin on Honing: C. Allen Fulmer Co., Dept. S., 107 E. 4th St., Cincinnati 2, Ohio.



THE WORLD'S BEST  
**Fulmer honing equipment**

For more data circle 312 on Postpaid Card



## How the choice of a cutting fluid affects your costs

Often—perhaps *too* often—the supplier of cutting fluids for machining or grinding, points to the quality of the work and totally ignores its surprising counterpart—a lower overall cost of operation.

Many a user of petroleum-base fluid might never notice the oversight. A better fortified coolant, which costs more per gallon, would not seem to reduce the final cost of the work, although it can readily be proven to produce better machined parts.

But it is pertinent to examine more closely the cost factors. The facts may surprise machine shop men who have not fully considered all the items which influence their costs. The measurable, tangible cost factors are these:

- Initial cost
- Cost of mixing
- Production rates
- Tool or wheel life
- Machining cost
- Overhead
- Cost of cleaning
- Life of the fluid
- Cost of rejects
- Reworking costs caused by rust

A comparison of first cost with final cost per piece, made on the basis of long experience with both conventional water-soluble oils and the newer chemically conceived fluids reveals some astonishing figures. Just a quick glimpse:

- The modern fluid costs about four times as much as the old soluble oil.
- But that modern coolant can be cut with three times as much water as the oil-base fluid.
- The modern coolant requires less make-up.
- It lasts over six times as long as the oil emulsion—contains nothing to make it turn rancid.
- It enables faster production—machines can be speeded up.
- It requires less frequent emptying and cleaning of machines.
- The over-all cost of coolant per piece produced has repeatedly proved



to be upwards of 40%, less with a good chemically conceived coolant than with a conventional soluble oil!

There are intangibles, too, which are not as measurable, but which affect both cost and quality. To mention a few: Cleanliness of shop, operator satisfaction, visibility of work, smoke problems, accuracy of work, adaptability to a wide range of jobs, and safety (fire hazard, slipperiness of floors, etc.).

It is illuminating to examine all of these direct and indirect influences a cutting fluid can exert. Little wonder that it is termed the "third leg" of the base on which successful ma-

chining depends—the others, of course, being the tooling and efficiency of the machine itself.

Our concern is with the fluid itself, because Houghton has made and supplied many types through the past half-century.

Our recent successes have been with the chemically conceived types of coolants, scientifically fortified to do a double job of improving quality and cutting final costs. *Hocut 237* is a perfect example of such a coolant. Data on its applications and availability will gladly be supplied. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

# **H** Houghton

INDUSTRY'S PARTNER IN PRODUCTION

For more data circle 313 on Postpaid Card



## *He's Watching a Band Sawing Miracle*

This band saw operator at the Bell & Gossett Company plant in Morton Grove, Illinois, is watching "Controlled Accuracy" . . . accuracy, being held to within a few thousandths of being perfectly straight, and he can actually see the band blade being guided in the saw cut to produce this accuracy! No further machining is required before the pipe is welded into an assembly for a Bell & Gossett Heat Exchanger Unit.

Band sawing accuracy like this is nothing short of miraculous—especially when it can be done on a high production basis, as Bell & Gossett is doing. And when the same tolerances can be held on cut-off pieces from 2" to 18" in diameter, this MARVEL #81 Band Saw Machine can be truly called a precision machine tool.

The secret of this amazing sawing accuracy is in the MARVEL "SURE-LINE" Automatic Accuracy Control—a simple and extremely effective

electro-mechanical servo-mechanism that continuously senses and automatically corrects any tendency of a band blade to drift to either side of a desired line of cut. The "SURE-LINE" unit literally "steers" the blade to make a straight cut. This permits the use of heavier feed pressures and, when desirable, higher blade speeds, to do the work faster, without sacrifice of accuracy. Incorporated in the new MARVEL #81 Series High Speed Heavy Duty Hydraulic Band Saws, the "SURE-LINE" permits full utilization of all the advantages of high speed steel band saw blades—while extending their usable blade life as much as 50%.

Before you buy any band saw machine, get complete details on MARVEL #81 Series Single Cut, or Automatic Shuttle Type Bar Feed Production Band Saws—the machines **DESIGNED AND BUILT TO REDUCE SAWING COSTS. Write for catalog today.**

**ARMSTRONG-BLUM MANUFACTURING CO.**  
5700 West Bloomingdale Avenue • Chicago 39, Illinois

For more data circle 314 on Postpaid Card



## **AUTOMATIC COMPENSATION FOR MISALIGNMENT WITH EMPIRE FLOATING TOOL HOLDERS AND TAP HOLDERS**

### **Check These Exclusive Empire Floating Tool Holder Features:**

- Automatically compensates for both angular and parallel misalignment.
- Eliminates bell mouthed and over-sized holes—permits extremely close tolerance work.
- Free and easy movement . . . tool holder sleeve and shank float independently of each other.
- Amount of float is infinitely adjustable.
- Smoother running . . . moving parts ride on rollers.
- Minimum of maintenance . . . holder has only five parts.

**TOOL HOLDER**



**TAP HOLDER**



Standard equipment with leading Machine Tool Manufacturers. Tool Holders and Tap Holders are available with either straight or tapered shanks.

### **Check These Exclusive Empire Floating Tap Holder Features:**

- Automatically corrects parallel and angular misalignment.
- Designed to prevent freezing under tension—taps float in and out.
- Wide range of float—simple adjustment lock-nut provides accurate control of degree of float.
- No springs or pivot members to restrict float.
- Floatation feature makes it easier to hold close tolerances.

# **E**MPIRE TOOL COMPANY

11503 LAMBS ROAD • MEMPHIS, MICHIGAN

For more data circle 315 on Postpaid Card

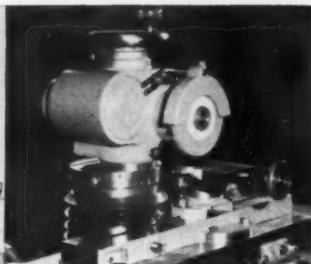
# CINCINNATI

## Cutter and Tool Grinders

*... accurately grind just about  
every cutter in the shop*



Stagger tooth cutters



Flat form tools



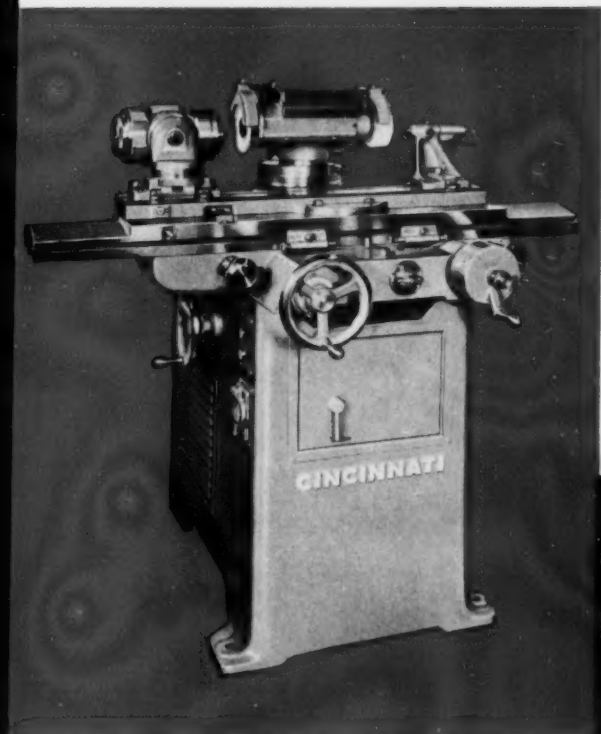
Lathe and planer tools



CINCINNATI Nos. 1 and 2 Cutter and Tool Grinders give you the opportunity to attain two desirable objectives in your cutter maintenance program: 1) quickly and accurately restore your cutters to top cutting trim; 2) grind cutters of any size and type, ranging from small end mills no bigger than a pencil to heavy 18" diameter face mills.

**CINCINNATI**<sup>®</sup>  
MILLING MACHINE DIVISION

KNEE TYPE AND BED TYPE MILLING MACHINES • DIE SINKING



CINCINNATI No. 2 Cutter and Tool Grinder



Shell end mill cutters

Check these advantages of CINCINNATIS against any other equipment within their range:

- Anti-friction table slide
- Eccentric wheelhead swivel
- Four-position operating control
- Accurate "Tange-Bar" taper setting device
- Dozens of attachments and accessories

And there are many other reasons why CINCINNATI Cutter and Tool Grinders provide an exceptionally strong secondary line of production equipment for machine tools of all types. May we send you complete information on Cincinnati's versatile Nos. 1 and 2 Cutter and Tool Grinders? Write today for catalogs No. M-1852-3 and No. M-2004.

MACHINES • VERTICAL BROACHING MACHINES • CUTTER AND TOOL GRINDERS • ELECTRICAL MACHINING EQUIPMENT

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

March, 1961

For more data circle 316 on Postpaid Card

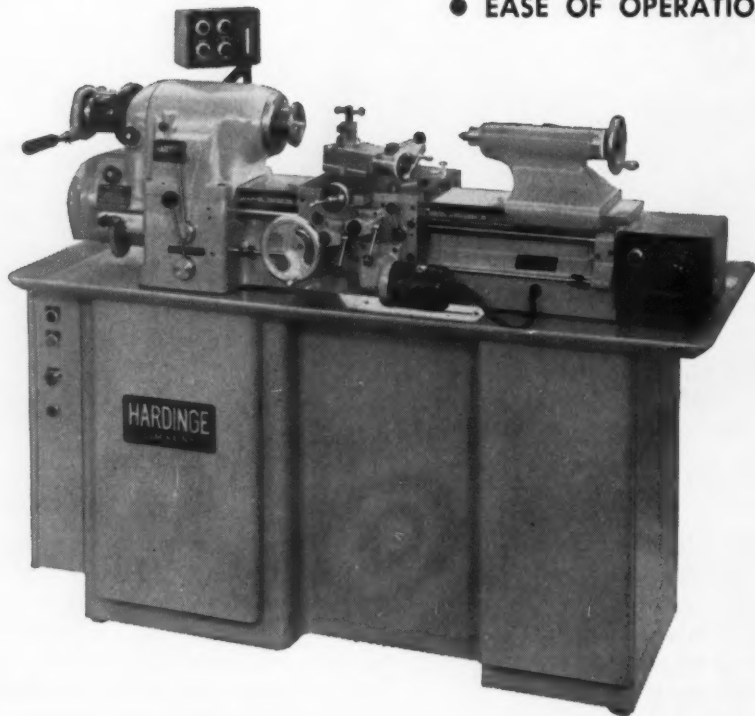
MODERN MACHINE SHOP 11

**HARDINGE**  
ELMIRA, N.Y.

## **"Outstanding Tool Room Lathe"**



- EXTREME ACCURACY
- HIGH SPINDLE SPEEDS
- EASE OF OPERATION



**Model HLV-H  
TOOL ROOM LATHE**

*Write for Bulletin HLV-H*

**HARDINGE BROTHERS, INC., ELMIRA, N. Y.**

*For more data circle 317 on Postpaid Card*



# NOW! The Famous SPEEDICUT "CHIPBREAKER" in STUB SCREW MACHINE LENGTHS



THE PATENTED RIB<sup>®</sup>  
that cannot be duplicated

If your drilling operations include the use of screw machines and automatics, portable drilling equipment, hard metal drilling (such as stainless steel, high manganese, etc.), where short drills of extreme rigidity are necessary—you should try the new Stub Screw Machine Length SPEEDICUT "CHIPBREAKER." Permits uninterrupted drilling, eliminates down time for cleaning out packed spinnings and swarf. Your authorized SPEEDICUT "CHIPBREAKER" distributor will gladly arrange a demonstration in your plant. See for yourself how the SPEEDICUT "CHIPBREAKER," with the patented rib, increases production, cuts drilling time and costs. Write today for brochure and name of local distributor.

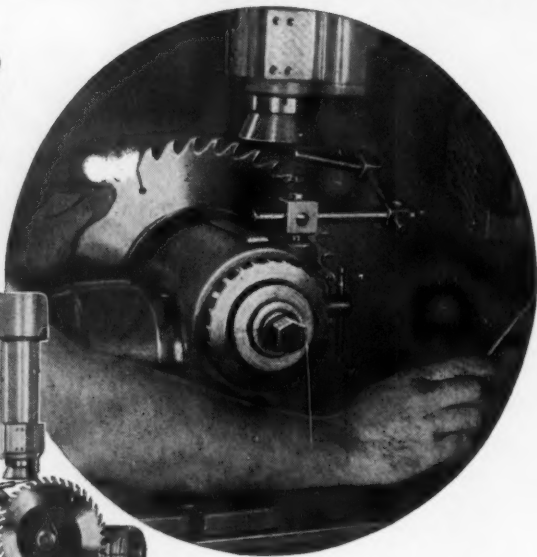


U.S. Patent Number 2,740,005

SPEEDICUT DIVISION, CHICAGO HEIGHTS STEEL CO., CHICAGO HEIGHTS, ILL.

For more data circle 318 on Postpaid Card

# SHARPEN YOUR OWN SAWS AND *Save!*



... simple to set up and use. The Oliver Ace grinds every angle of every tooth of your carbide and high speed saws—*fast!* The machine is designed to bring the wheel to the saw, providing a more accurate grind. It requires no computations and permits direct reading for clearance. Available in two models.

Also used for sharpening face mills, reamers, hobs, spot facers, straight and spiral cutters — and all general purpose tools. Write today.

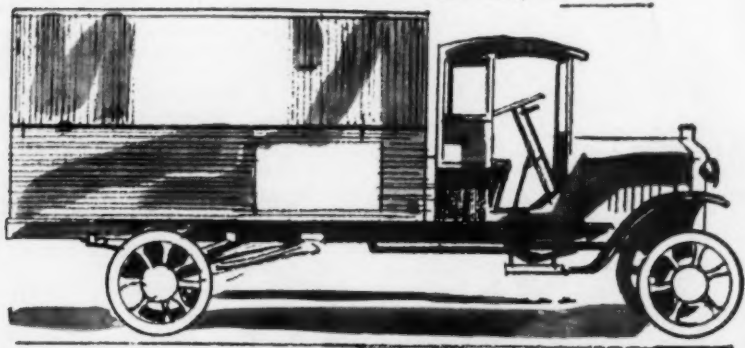
**OLIVER of ADRIAN**

OLIVER INSTRUMENT COMPANY

1430 E. Maumee St. • Adrian, Michigan

For more data circle 319 on Postpaid Card

# Delivering lost profits?



You can't afford to deliver your goods in obsolete equipment; that would be poor economy and tough on your name.

But what about obsolete production equipment? It may be out of sight, but it delivers a far greater loss in wasted time and manpower, excessive unit costs and reduced quality.

You might be surprised how easy it is to turn these losses into profits with a modern Gisholt Turret Lathe. These rugged lathes incorporate all the advantages you need to keep ahead of demands for higher, faster production and lower costs.

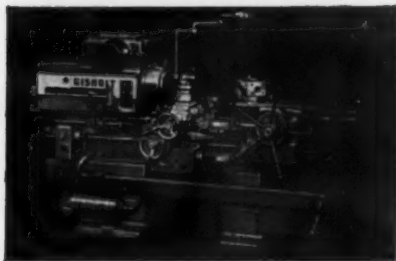
Ask your Gisholt Representative about Gisholt Ram and Saddle Type Turret Lathes — how they can be put to work in your plant earning extra profits, paying for themselves. Call him today or write for literature.

## GISHOLT

MACHINE COMPANY

Madison 10, Wisconsin

Investigate Gisholt's Extended  
Payment and Leasing Plans



Gisholt Ram Type Turret Lathe



Gisholt Saddle Type Turret Lathe

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes  
• Factory-Rebuilt Machines with New Machine Guarantee

For more data circle 320 on Postpaid Card

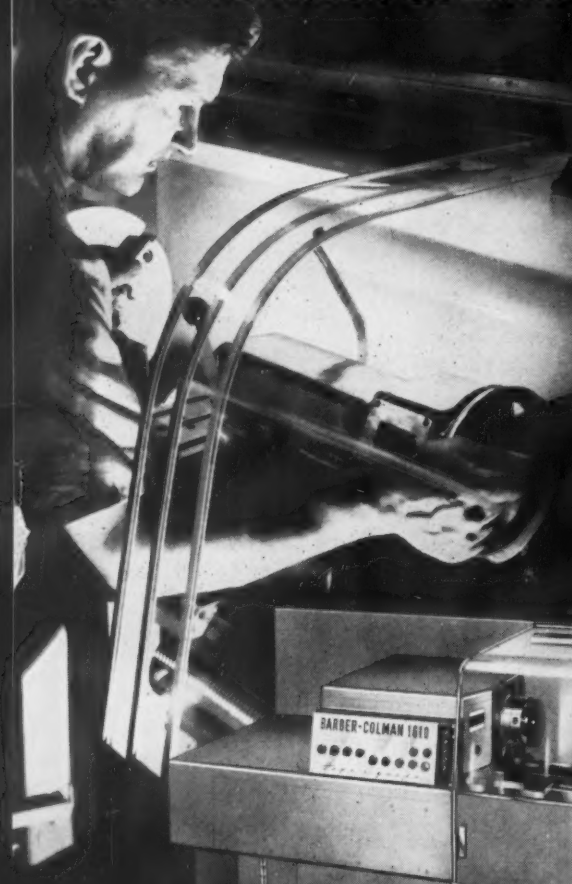
March, 1961

MODERN MACHINE SHOP

15

# The New Ideas in Turning...

are from BARBER-COLMAN



Here you see the core of the new Barber-Colman lathe line. These machines show the unencumbered thinking that goes on at Barber-Colman. They show the heritage that has produced such important design innovations as sealed gearboxes, simplified control groupings, hardened and ground bedways, precision anti-friction bearings, and completely automatic lubrication.

Take advantage of the increased productivity these machines offer. Detailed catalogs are available without obligation. Call your Barber-Colman representative today . . . he's listed in this directory.

**NEW Taper-guide (16" and 20")**—Can turn all practical tapers without "hunting," produce simple radii, cut chamfers without special tools, cut off and bore or machine at 90° to work axis—all without feedback or complex electronics. Low capital equipment cost, low-cost operation and maintenance.



**NEW 1610 "specialist" (16 $\frac{1}{2}$ " and 20")**

—Reduces both capital equipment and operating costs. Class B operators readily become proficient at machining accurate nonthreaded parts. Infinitely variable spindle speeds to 1500 rpm; infinitely variable power feed to both carriage and cross slide; five-position turret-type longitudinal feed stop. Available with hydraulic tracer at only slightly more cost than a standard lathe without tracer.

**NEW 1307T toolroom lathe (13")—**

High capacity and timesaving controls combined with super precision. Infinitely variable speeds to 3000 rpm in belt drive can be changed under load. Selected Class ABEC-7 super-precision spindle bearings; ground-from-the-solid actuating screws; antifriction bearings on all shafts; Meehanite castings; hardened-and-ground headstock gears; splined shaft connections. Available with hydraulic tracer.

**NEW 1610T toolroom lathe (16 $\frac{1}{2}$ " and 20")—**

The minute you push the start button and grab the handwheel, you feel the difference toolmakers look for. Try the speed-change dial for fast facing or a light finishing cut on the OD. Smooth, silent, fast acceleration under load—infinitely variable speeds *even while cutting*, to 1500 rpm in the high range. Hydraulic tracer available.

**NEW 2013T, 36-speed lathe (21" and 25")**

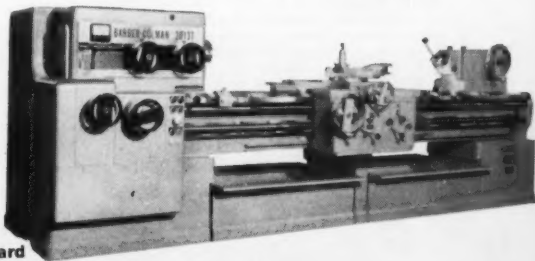
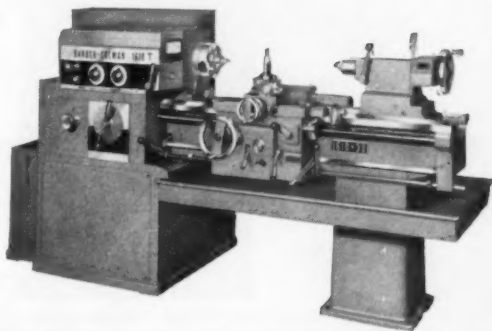
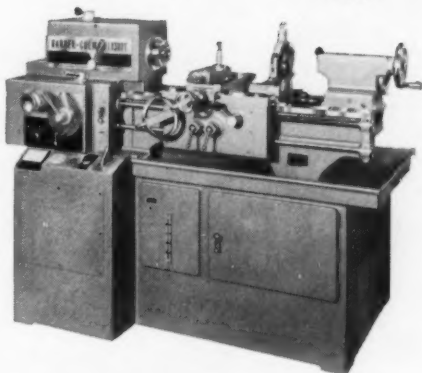
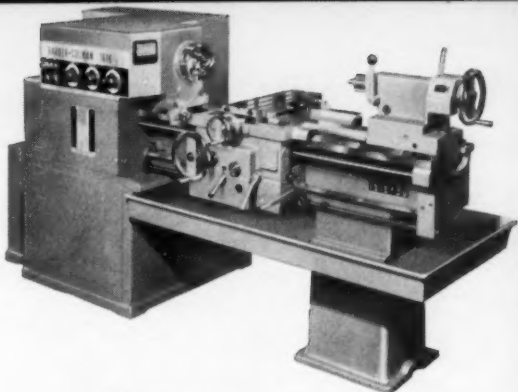
—All-new, geared-head precision lathe for high-speed production or toolroom turning . . . used in production shops with throwaway insert tools at speeds to 750 sfm. Tracer control optional. Spindle speeds to 1500 rpm (2000 rpm optional); 66 thread-cutting and feed changes; 500-lb, two-speed tailstock; separate lead screw and feed shaft. New rigidity, new threading features, new accuracy.

**Barber-Colman Company**



34 Loomis St., Rockford, Ill.

For more data circle 321 on Postpaid Card



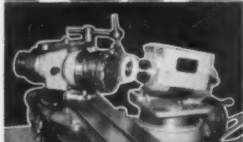
# For Profitable Production of Accurate Parts

*specify*

# POPE

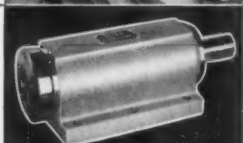
# PRECISION SPINDLES

## GRINDING



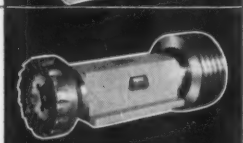
pictured is Pope P-6651-B Motorized Super-Precision Tilting Head for No. 2 Cincinnati Tool and Cutter Grinders. It is but one of hundreds of different Pope Grinding Spindles — motorized, belt driven, external, internal, deep hole, etc.

## BORING



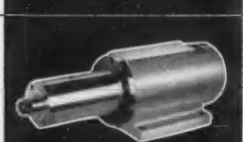
shown is Pope P-18501B Heavy Duty, Flange Nose, Belt Driven Precision Spindle for large deep hole boring and facing tools. Others include multi-spindle boring heads, motorized and motorized-belt driven high speed heads and super-precision heads for boring holes round.

## MILLING



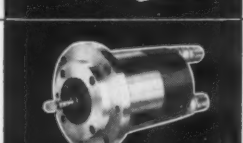
this Pope P-12007-M50 Heavy Duty, Belt Driven Spindle is available in sizes from 1 to 50 HP with standard No. 10, 20, 34, 40, 50 or 60 milling machine noses. (Ask for Bulletin S-17.) Other milling spindles include motor driven, gear hobbing, tracing attachment, right angle and offset types.

## GRINDING MILLING DRILLING CUTTING



this Pope P-1029-AU Motorized, Heavy Duty Spindle is available from 900 to 3600 RPM and up to 20 HP. Shaft can be arranged to hold grinding wheels, milling cutters, drills or other cutting tools. Quick-change collet chucks are used for drilling, universal collet chucks for end milling.

## HIGH FREQUENCY



this Pope P-940 Motorized, Water Cooled, Oil Mist Lubricated, Grinding Spindle runs at 100,000 RPM, features low maintenance cost. Other heavy duty, high cycle Spindles at lower speeds are available for milling and other operations, and for mounting in a horizontal or vertical position.

## ANOCUT ELECTROLYTIC GRINDING



this Pope P-19162-AN Spindle has built-in insulation and rugged fork type cool operating brush assembly for transmitting low voltage high amperage current to wheel. Others include belt driven types and are arranged to operate from 50 to 3000 amps.

One of the 20,000 different Pope Spindles may be just the one you need. May we have your specifications?

No. 133A

# POPE

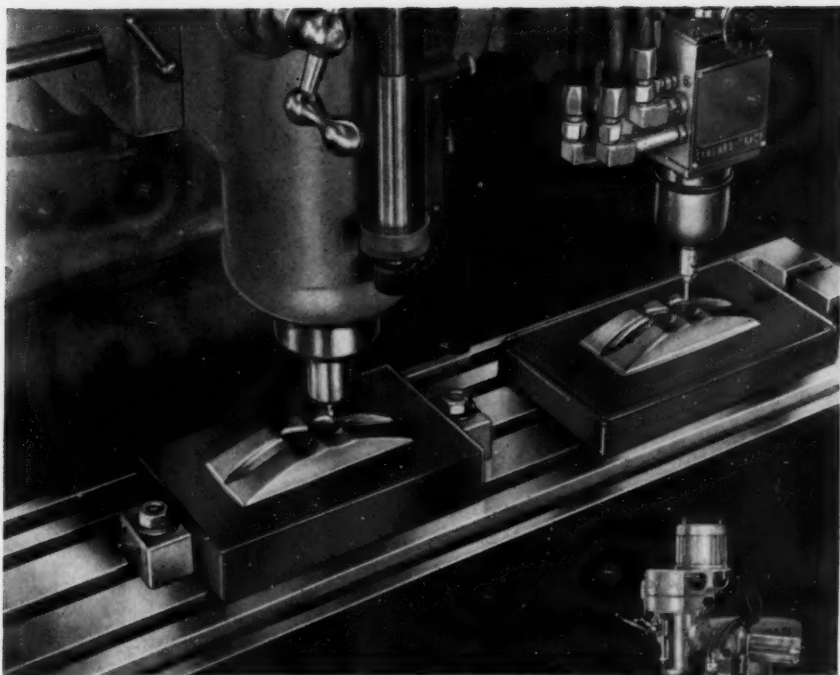
**ENGINEERS, DESIGNS AND BUILDS  
PRECISION ANTI-FRICTION BEARING SPINDLES  
FOR EVERY PURPOSE**

**POPE MACHINERY CORPORATION • 261 RIVER STREET • HAVERHILL, MASS.**

*Established 1920*

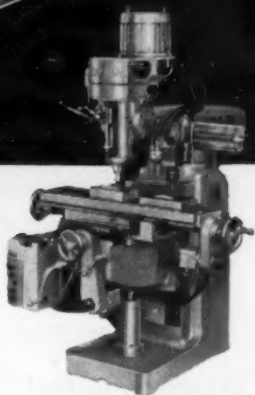
For more data circle 322 on Postpaid Card





## NEW AUTOMATIC DUPLICATOR **GORTON** Synchro-Trace Mastermill

Now . . . in response to metal-working needs, Gorton presents a fully automatic rise and fall duplicator, ideal for all types of dies and molds in ferrous and non-ferrous materials. Sensitivity and accuracy are combined in this rugged milling machine with versatility for power feed and hand feed milling operations . . . a duplicator to provide you with the simplest, fastest, most accurate way to make dies and molds.



Write for Bulletin 2095 for full particulars on Gorton Mastermill with integrated Synchro-Trace or Contact Gorton Distributor in your area.



A GORTON PRODUCT, THE FINEST OF ITS KIND!



GEORGE **GORTON** MACHINE CO.  
1700 RACINE STREET RACINE, WISCONSIN

Milling, Die Sinking, Profiling and Engraving Machines with Manual Hydraulic, Electro-Hydraulic or Numerical Guidance Systems.  
SINCE 1893 Special Machines and Automated Transfer or Indexing Machines. Cutting Tools and accessories. Defense and special products.

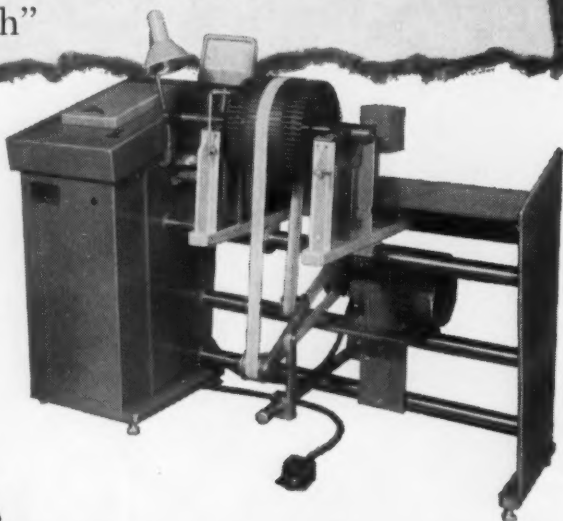
For more data circle 323 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 19

"unskilled workers balance up to 200 parts  
an hour with accuracy of 20 millionths  
of an inch"

that's what  
they are  
saying  
about the  
*new*



# BEAR BEKOMATIC BALANCER

- ✦ Operated from sitting or standing position
- ✦ Endless belt drive for positive speed and fast loading
- ✦ Quickly set up with simple tooling for all sizes and shapes
- ✦ Heavy duty, requires minimum maintenance
- ✦ Direct reading meter in front of operator

*The simplest, fastest, most accurate industrial balancer made today!* Single knob control shows both magnitude and location of unbalance... cantilever mounting permits fast and easy loading of work parts... no footing or foundation needed. The Bear BeKomatic is available in three horizontal models and two vertical models ranging in capacity from one ounce to 400 pounds. Proven in constant use by leading manufacturers for over five years.

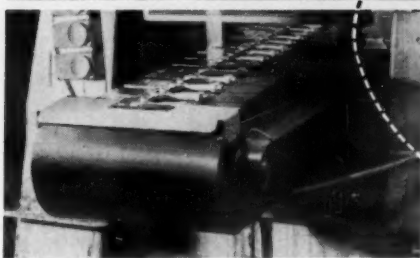
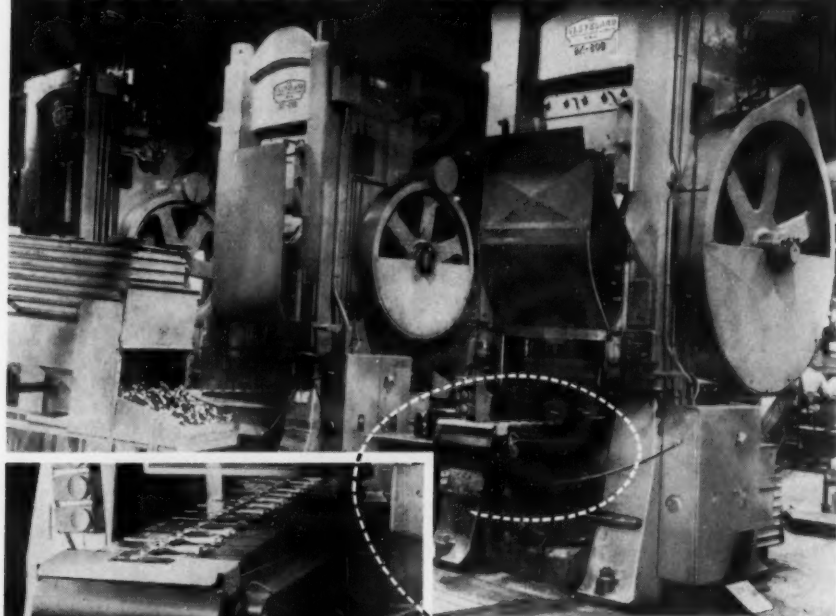


BEAR MFG. CO., Dept. M-14B, Rock Island, Illinois  
**FREE**—New BeKomatic Catalog and details on a  
demonstration at no cost or obligation.

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

For more data circle 324 on Postpaid Card

# CHIPLESS MACHINING



A major manufacturer of 8-cylinder automotive engines cuts production costs by sizing and qualifying connecting rods with these Cleveland Presses.

## CLEVELAND KNUCKLE JOINT PRESS

Fully automated with chain-type conveyor feed, these three 800-ton Cleveland Knuckle-Joint Presses eliminate expensive machining operations. Cleveland's massive, carefully fitted knuckles exert a "super" squeeze on the cold metal that straightens the part, sizes it to close tolerance of the order of .0005".

This "chipless machining" is cutting costs in forge shops and automotive engine manufacturers due to the greater accuracy possible with Cleveland Presses. Cleveland's long slide bearing surfaces and rugged frame construction hold deflection to a minimum under maximum load.

With capacities from 150 to 3000 tons and bed areas from 18 x 18" to 50 x 54", Cleveland Knuckle Joint Presses do the job efficiently, economically. Investigate the COST-CUTTING advantages of these Cleveland Presses by writing today for Catalog K2.

A-80012A

### OTHER COST-CUTTING CLEVELAND PRESSES

INCLINABLE • STRAIGHT SIDED CRANK • STRAIGHT SIDED ECCENTRIC • 4-POINT UNDERDRIVE • DOUBLE ACTION TOGGLE



E. 40th and St. Clair Avenue, Cleveland 14, Ohio

For more data circle 325 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 21

# NOW! CUT YOUR ASSEMBLY COSTS THESE 5 WAYS



## *Single Machine Presses and Stakes Automatically*

THE NEW CRAMER

# PRESSTAKER

Machine Tool Division - CRAMER CONTROLS CORPORATION - Centerbrook, Conn.  
For more data circle 326 on Postpaid Card

**SET UP IN LESS THAN ONE MINUTE** — cut capital equipment investment, save space.

**ELIMINATE SUBASSEMBLY INVENTORIES** — assemble from primary components, saving scheduling, parts transfer and tool changeover time.

**CUT SCRAP LOSS, DESIGN LIMITATIONS** — set close tolerances (within .001!) without risking damage or distortion in staking, even with non-metallics.

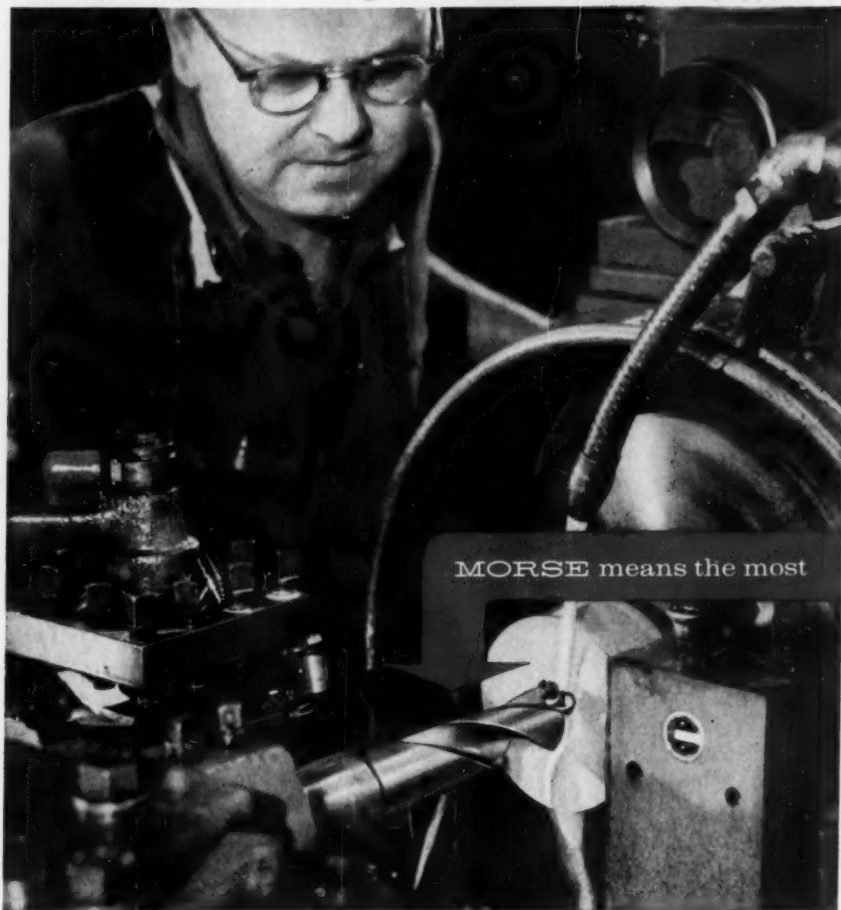
**USE THE MATERIALS YOU WANT** — stake with a tap barely heavy enough to set a tiny eyelet, or with over-one-ton impact.

**AUTOMATICALLY** — combined press-stake-eject cycle is completely automatic, for production rates to 1400 assemblies per hour.

PRESSTAKER is an assembly tool that combines press-fitting with final staking at rates impossible with separate machines. Models available for almost every assembly job. Hundreds in use by companies you know.

**LEARN HOW** you can turn assembly costs into profits. Send for fact-filled Bulletin M3.

with men who know cutting tools...it's **MORSE** everytime



**TRY MORSE...BUY MORSE**  
**SEE YOUR NEARBY MORSE DISTRIBUTOR**

**MORSE**

**MORSE TWIST DRILL & MACHINE CO.**  
NEW BEDFORD, MASSACHUSETTS



A Division of VAN NORMAN INDUSTRIES, INC.



2402

WAREHOUSES IN: NEW YORK • CHICAGO • DETROIT • DALLAS • SAN FRANCISCO  
For more data circle 327 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 23

# LAYOUT FLUID

FOR ANY METAL

Send for

FREE SAMPLE

Your local supply house carries Dayton Rogers', Layout Fluid.

Applicable to all metal. One merely wipes the surface clean and then brushes on the Layout Fluid.

Dries Instantly. No waste. Scribed lines are pronounced and contrast to the dark blue background, thus relieving eyestrain.

Assures greater accuracy and speeds up work. You will save time and money on all layout jobs.

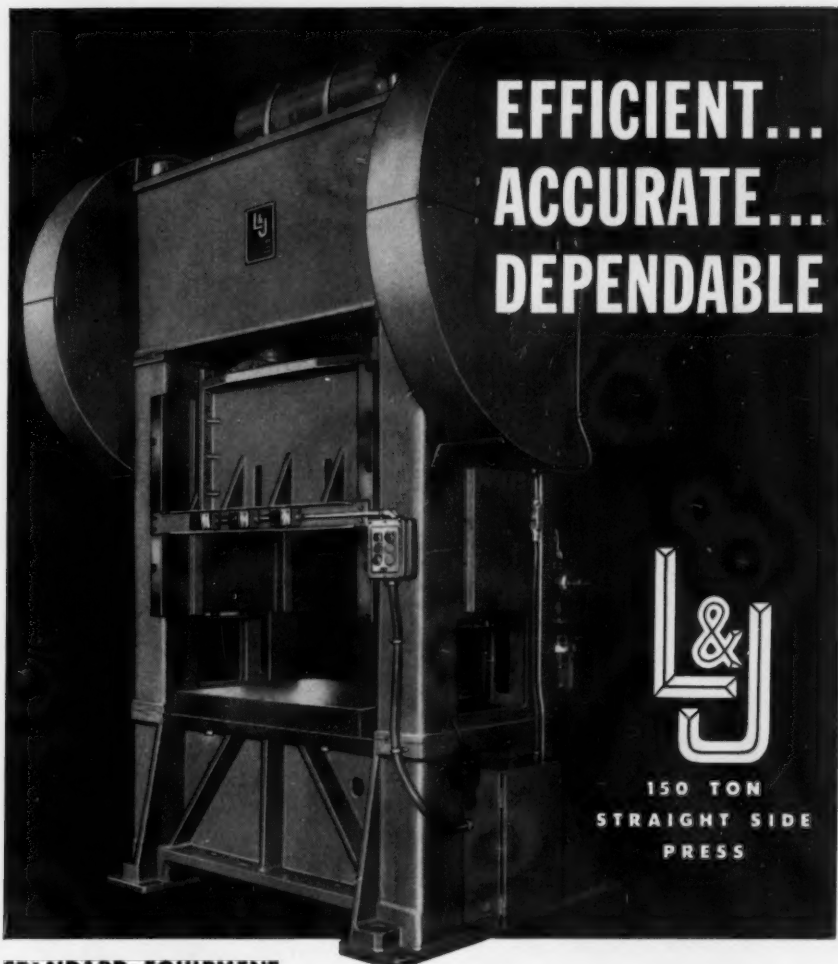
A sample is waiting for you. Send for it today.



**DAYTON ROGERS**  
*Manufacturing Company*  
MINNEAPOLIS 7, MINNESOTA

For more data circle 328 on Postpaid Card





**EFFICIENT...  
ACCURATE...  
DEPENDABLE**



**150 TON  
STRAIGHT SIDE  
PRESS**

**STANDARD EQUIPMENT  
ALL HIGH QUALITY**

including—Air clutch. Shaft driven limit switch. Dual air valve. Replaceable wear strips on slide. Hard bronze crankshaft bearings. Replaceable ball seats. Gears run in oil.

**Write** for catalog... also O.B.I. and gap frame presses.

- Single geared, twin end drive, double crank... maximum quality.
- Long, square gibbing maintains alignment.
- Heavy welded steel box-type frame with tensioned tie rods insures rigidity.
- Large die space — 36" x 48" slide face, 36" x 48" bolster area.

**L & J PRESS CORPORATION**

For more data circle 329 on Postpaid Card

1624 STERLING AVE.  
ELKHART, IND.

March, 1961

MODERN MACHINE SHOP 25

**IT'S A FACT!**

# DRILLHEADS

ARE OBVIOUS.

Tremendous economies from the use of multiple-spindle drillheads are obvious. Drilling one hole at a time cannot be tolerated in this day of automation!

THOMSON

## THRIFTMASTER

Drillheads  
are your best Drillhead buy...

1. They are better built and cost no more (Full ball bearing construction, hardened gears, spindles and driver, and precision grinding!)
2. This means they last longer
3. This eliminates down time
4. This eliminates production losses
5. This drastically reduces drilling costs

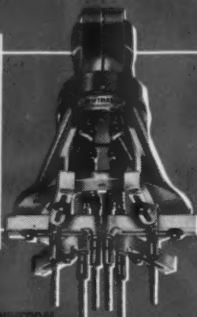
THOMSON

## THRIFTMASTER

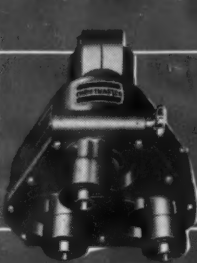
Drillheads are designed and produced by engineers whose experience in this specific field dates back to 1923. This long accumulation of engineering technique and production "know-how" is reflected in our product—a quality tool...solid, substantial and dependable!



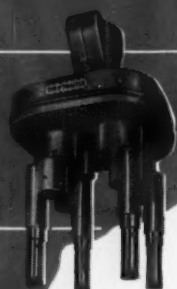
FIXED  
CENTER



UNIVERSAL  
ADJUSTABLE



ECCENTRIC  
ADJUSTABLE



DOUBLE  
ECCENTRIC  
ADJUSTABLE

**DRILL • TAP  
REAM • BORE  
COUNTER • BORE  
COUNTER • SINK  
FACE...with  
THRIFTMASTER**

**THRIFTMASTER**  
PRODUCTS CORPORATION

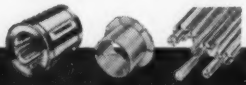
Ask NOW for our new catalog!

1010 NORTH PLUM STREET  
LANCASTER, PENNSYLVANIA  
Phone EXpress 2-2101

Also Makers of DORMAN AUTOMATIC REVERSE TAPPERS

Subsidiary of  
**THOMSON INDUSTRIES, INC.**  
makers of

BALL BUSHINGS • NYLINERS • 60 Case Shifting



For more data circle 330 on Postpaid Card

# New ACCO Electric Presses for heavy industrial work - - 8 models to choose from

Expressly designed to do a wide variety of industrial press jobs at low capital investment, new ACCO electrically powered hydraulic presses turn out jobs with ease and safety—and on a continuous duty cycle. Frame members are fabricated from selected structural steel for maximum rigidity and minimum deflection. Convenient hand wheel brings ram in rapid contact with the job, saving the full power stroke for pressing. Here are a few of the other outstanding features and advantages that ACCO presses offer:

- Motor and radial piston pump in single integral unit can be run continuously
- Pre-set safety valve prevents overload. Limit control prevents over-travel of ram
- Closed hydraulic system cannot become contaminated
- Prominent Helicoid gauge gives operator accurate pressure reading at all times
- Self-locking, screw-gearred winch with sealed lubrication moves work table over broad range of travel
- Available in 25, 40, 60, 80 and 150 ton capacities

For complete details, contact your ACCO Equipment distributor. If you don't know his name, write us at York, Pa., we will send full details.

**ACCO**



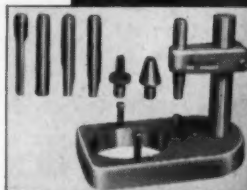
## ACCO HYDRAULIC PRESSES

Acco Equipment Division • American Chain & Cable Company, Inc.  
York, Pa., Chicago, New York, Denver, San Francisco, Bridgeport, Conn.

For more data circle 331 on Postpaid Card



**Universal  
Test Centers**  
For checking  
run-out  
of shafts  
and axles



**Rivet  
Upsetting  
Tool**  
For hot and  
cold rivet  
upsetting

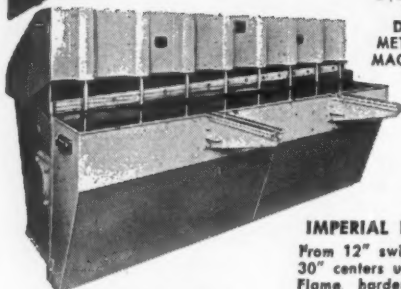


**Auxiliary  
Arbor  
Press**  
3-ton capacity  
for light  
jobs...  
available  
with  
all models

EXTRAORDINARY PRECISION & QUALITY  
INCOMPARABLE • BEST VALUES IN U. S. A.

# NEW MODELS • NEW FEATURES

EXCLUSIVE  
U.S.A.  
DISTRIBUTORS  
FOR:  
OVER 40 OTHER  
LINES OF  
DIVERSIFIED  
METALWORKING  
MACHINE TOOLS



## IMPERIAL WIEGERT GUILLOTINE SHEARS

- ALL STEEL CONSTRUCTION
  - SINGLE STROKE CONTROL
  - PERMANENT ACCURACY
- 8" gaps on all models. Cuts thin and heavy gauge accurately.

From 6", 14 gauge \$2384.00  
To 12", 1/4 gauge \$12,200.00



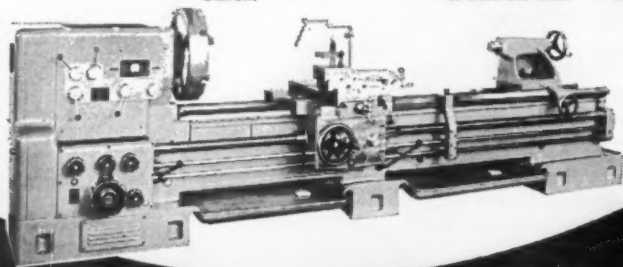
## SEMCO PRESS BRAKES

6" and 8" models, 12 and 10" gauge to 35 tons. Solid one piece lower bed. Extra large shut height 12 1/2" full, ball roller bearings. Same bending results are obtained at any point on a full length set of accurate dies. From \$3675.00

## IMPERIAL Precision Lathes

From 12" swing to 100" swing, 30" centers up to 300" centers. Flame hardened, ground bed ways. Heat-hardened gears throughout. Precision roller spindle bearings.

- From 12" x 40" \$1393.00
- To 42" x 67" \$21,280.00
- Extra large holes through the spindles up to 13 1/2".
- Missile Lathes swing up to 100".
- T Lathes up to 60" swing.
- SPECIAL LATHES BUILT TO ORDER.



# AARON MACHINERY CO., Inc.

45 CROSBY ST., N. Y. 12 • WA 5-8300

BRANCHES AT:  
MINEOLA, N. Y.  
OAKLAND, CAL.  
LOS ANGELES, CAL.  
HOUSTON, TEXAS

See our display at the Western Metal Exposition, Pan Pacific Auditorium, Los Angeles, Calif. Mar. 20-24. Booth 660  
For more data circle 332 on Postpaid Card

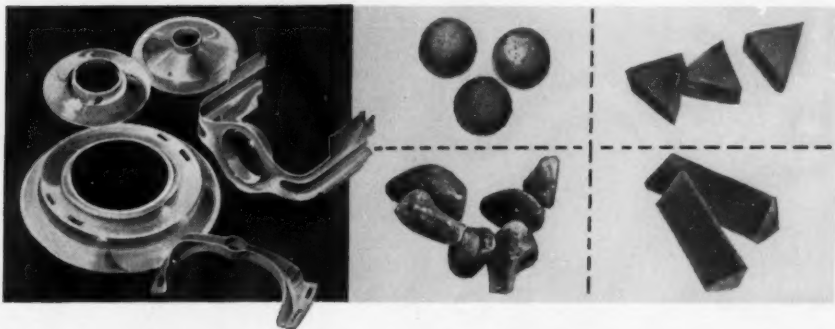
## Barrel finishing is best finishing ... to cut your assembling costs

**Assembling finished parts is no longer the money-wasting problem it used to be.**

Barrel finishing with Norton TUMBLEX abrasives is your modern solution... your surest, quickest way to remove burrs, heat scale, sharp or rough edges and other surface imperfections that keep complicated parts from fitting together smoothly and accurately.

We say *your* solution because the scope of TUMBLEX abrasives is virtually unlimited. The parts you finish... for assembling or for any other purpose... can be of any metal, ferrous or non-ferrous... or non-metallic including plastics and even woods... as hard as sintered oxides or soft as the softest machinable material... and their sizes can range from miniature to massive.

Barrel finishing with the right TUMBLEX abrasive not only improves your product appearance and quality — its speed and simplicity can increase your man-hour productivity and cut your cost-per-piece produced.



Without extensive hand-finishing and fitting, the assembly of these stamped component parts of an automotive thermostat was long and difficult. Barrel finishing with Norton TUMBLEX\* abrasive proved unequalled for removing burrs that brought new speed to assembling.



**Making better products... to make your products better**

**NORTON PRODUCTS:** Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals

**BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

**For more data circle 333 on Postpaid Card**

**Get complete proof.** Send sample parts to our Sample Processing Department. We'll barrel finish, return samples and report the methods and abrasives you need for new production advantages. NORTON COMPANY, General Offices, Worcester 6, Massachusetts. Plants and distributors around the world.

\*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries

G-408

# INSPECTION PROJECTOR MAGNIFIES FOR **®** QUALITY...

Our inspection projector magnifies cutting edges to eliminate the minute angular deflection that could cause you costly production losses . . . just one of many inspections that account for Circle R quality.

CIRCLE R saws, slitters and combination center drills must submit to constant exhaustive inspection to work their way to you. They've got to prove they can ensure you correct cutting angles, long service, and minimal downtime.

Consult these CIRCLE R Specialists . . .

**BUREAK**  
Production Mach. Sales Inc.  
**CEDAR RAPIDS**  
McNeal Tool & Supply Corp.  
**CHICAGO**  
Donald Robertson & Co.  
**CLEVELAND**  
Production Tool Co.  
**DAYTON**  
J. R. Kuntz Company  
**DETROIT**  
J. L. Bradford Associates

**HACKENSACK**  
The Eaton Company  
**INDIANAPOLIS**  
Donald McIntire  
**MEMPHIS**  
Branch-Morris  
Tool Specialists  
**MILWAUKEE**  
Ford Tool Company  
**MONTREAL**  
Humphrey B. Walton  
**NEW HYDE PARK**  
The Eaton Company

**NEW YORK CITY**  
J. V. Crampton (Export)  
**PHILADELPHIA**  
General Tool Sales Co.  
**PHOENIX**  
DieSpente Tool Center  
**PITTSBURGH**  
Ralph Espacato & Co.  
**PROVIDENCE**  
Fred J. McMillan  
**ROCHESTER**  
James D. Horne

## CIRCULAR TOOL CO., INC.

PROVIDENCE 5, RHODE ISLAND  
Specialists in Circular Cutting Tools Since 1923

METAL SLITTING SAWS • COPPER SLITTING SAWS • SCREW SLOTTING SAWS • COMMUTATOR SLOTTING SAWS • JEWELERS' SLOTTING SAWS • CUT OFF SAWS • CIRCULAR  
KNIVES & ROTARY SHEAR BLADES • CIRCOLOY STEEL SAWS • SOLID & TIPPED TUNGSTEN CARBIDE SAWS • COMBINED DRILLS & COUNTERSINKS • CENTER REAMERS

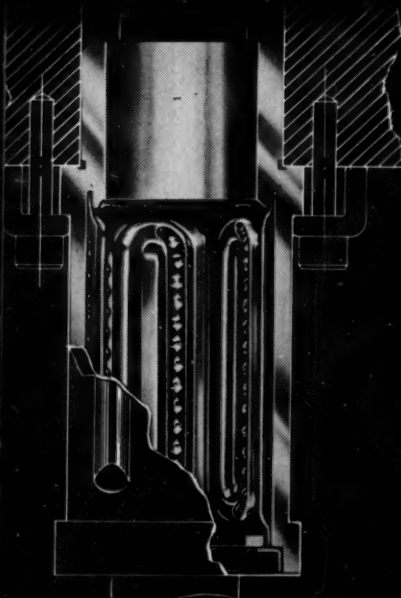
**PROJECTION INSPECTED**

**STAGGERED TOOTH SIDE CHIP SAWS**

*Send for Catalog P Showing More Than 1200 Items*

For more data circle 334 on Postpaid Card





# THOMSON INTERCHANGEABLE die-set BALL BUSHINGS®

## NEW!

### GO ANTI-FRICTION

with a simple bushing replacement

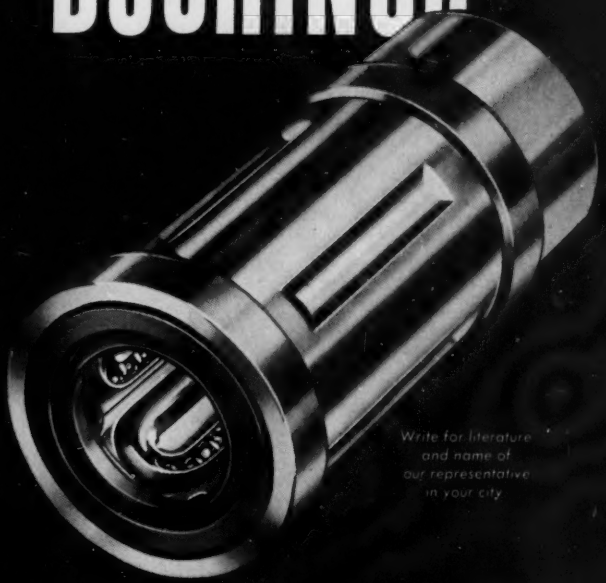
- and **1** Improve performance  
of your present dies
- and **2** Reduce tool room costs

#### In the PRESS ROOM

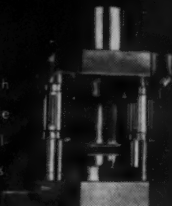
Ball Bushings allow closer fits and maintain alignment which increases die life and permits longer uninterrupted runs. Fewer sharpenings and sustained parts accuracy also result. Periodic lubrication is eliminated and higher speeds are possible. Unlimited travel permits die to be used in any press regardless of stroke. Costly smash-ups due to seizure are eliminated.

#### In the TOOL ROOM

No cocking and binding... hence the punch holder "floats" on and off! No time consuming die jacking! Free-rolling ball bearings enable the tool-maker to actually "feel in" the fit of mating parts. This saves more time and makes better dies.



Write for literature  
and name of  
our representative  
in your city



### THOMSON INDUSTRIES, Inc.

Dept. D4, MANHASSET, NEW YORK

Makers of 60 Case hardened & ground shafting and  
NYLINED Bearings... Sleeve Bearings of DuPont NYLON  
For more data circle 335 on Postpaid Card

Announcing  
**CARMET®**

# 700

Series Cutting Grades

to boost production—extend tool life up to 200%

If you're tooling-up for a really tough cut, try Carmet's new 700 Series Cutting Grades. Make one super-duty tool do the work of two or three—on any steelcutting job, including superalloys.

Carmet's 700 Series is a new, premium group of carbide grades just released after exhaustive field trials. Results were conclusive. These carbides stood up under the roughest interrupted cuts going. They gave longer tool life than competitive grades in the same application class. And, they produced exceptionally fine finish cuts, even in C-8 precision boring classifications.

Here are the 700 Series Steelcutting Grades, and their applications:

**CA-704** Hard and dense for the ultimate in finish cuts and precision boring.

**CA-711** Ideal for medium to finish cuts in the general purpose category.

**CA-720** Tough and thermal shock-resistant for medium and heavy cuts, including interrupted cuts.

These new Carmet Grades combine edge wear and crater resistance with an unmatched ability to endure shock. The 700 Series will outperform other groups of tools in any C-5 to C-8 application. Take a look at a few customer trial reports:

"Turning tapered, slotted, forged SAE 4140 valve plugs . . . formerly got 8 finished pieces per cutting edge. Now get up to 25 pieces with CA-720 on a tough, interrupted cut!"

"Turning OD of universal joint ears . . . now getting 177 pieces with CA-720 against 135 with former tool."

"On SAE 1035 rotor shafts . . . got 7 more shafts per tool with CA-711. And K Monel shafts . . . got more from 9 CA-711 tool corners than 12 corners on triangular inserts formerly used."

"On SAE 4320 forgings . . . a whopping 242 pieces with CA-720, against 209 with previous Carmet 600 Grade, 198 with best competing tool."

Remember, for less demanding operations, the 600 Series Cutting Tools will continue to be sold by Carmet. But for the really tough cut . . . when you've got to make chips on a mean, tool-buster of a job . . . this kind of performance from the 700 Series will save you time. And, cost you less than competing premium grades!

They're doing just that in shops all over the country . . . right now! Try them, just once, on your job. Your local Carmet Distributor has them in stock. Contact him for more information, or write: **Carmet Division, Allegheny Ludlum Steel Corporation, Ferndale, Detroit 20, Michigan. Dept. MS-3.**



**CARMET 700 SERIES CATALOG SUPPLEMENT NOW AVAILABLE**

There's a new Supplement to the Carmet Catalog C-16-B, listing tool and insert styles, and prices for the new 700 Series. Contact your local distributor, or write Carmet direct.

**CARMET®** 

CEMENTED CARBIDE • DIVISION OF ALLEGHENY LUDLUM

For more data circle 336 on Postpaid Card

↓ Use this Postpaid Card for requesting more information on products described and advertised ↓

# READER SERVICE CARD

MARCH, 1961

modern  
machine  
shop

431 Main Street, Cincinnati 2, Ohio

Your Name \_\_\_\_\_ Your Title \_\_\_\_\_  
 Company Name \_\_\_\_\_  
 Company Address \_\_\_\_\_  
 City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

Products Manufactured \_\_\_\_\_ Number of Plant Employees \_\_\_\_\_

Circle KEY numbers (NOT PAGE NUMBERS) for more information on items described or advertised in this issue

DO NOT WRITE IN THESE SPACES

EDITORIAL ITEMS										ADVERTISEMENTS											
1	26	51	76	101	126	151	176	201	301—Front Cover	410	435	460	485	510	535	560	585	610	635	660	685
2	27	52	77	102	127	152	177	202	302—Inside Front Cover	411	436	461	486	511	536	561	586	611	636	661	686
3	28	53	78	103	128	153	178	203	303—Inside Back Cover	412	437	462	487	512	537	562	587	612	637	662	687
4	29	54	79	104	129	154	179	204	304—Back Cover	413	438	463	488	513	538	563	588	613	638	663	688
5	30	55	80	105	130	155	180	205	305	326	347	368	389	414	439	464	489	514	539	564	589
6	31	56	81	106	131	156	181	206	306	327	348	369	390	415	440	465	490	515	540	565	590
7	32	57	82	107	132	157	182	207	307	328	349	370	391	416	441	466	491	516	541	566	591
8	33	58	83	108	133	158	183	208	308	329	350	371	392	417	442	467	492	517	542	567	592
9	34	59	84	109	134	159	184	209	309	330	351	372	393	418	443	468	493	518	543	568	593
10	35	60	85	110	135	160	185	210	310	331	352	373	394	419	444	469	494	519	544	569	594
11	36	61	86	111	136	161	186	211	311	332	353	374	395	420	445	470	495	520	545	570	595
12	37	62	87	112	137	162	187	212	312	333	354	375	396	421	446	471	496	521	546	571	596
13	38	63	88	113	138	163	188	213	313	334	355	376	397	422	447	472	497	522	547	572	597
14	39	64	89	114	139	164	189	214	314	335	356	377	398	423	448	473	498	523	548	573	598
15	40	65	90	115	140	165	190	215	315	336	357	378	399	424	449	474	499	524	549	574	599
16	41	66	91	116	141	166	191	216	316	337	358	379	400	425	450	475	500	525	550	575	600
17	42	67	92	117	142	167	192	217	317	338	359	380	401	426	451	476	501	526	551	576	601
18	43	68	93	118	143	168	193	218	318	339	360	381	402	427	452	477	502	527	552	577	602
19	44	69	94	119	144	169	194	219	319	340	361	382	403	428	453	478	503	528	553	578	603
20	45	70	95	120	145	170	195	220	320	341	362	383	404	429	454	479	504	529	554	579	604
21	46	71	96	121	146	171	196	221	321	342	363	384	405	430	455	480	505	530	555	580	605
22	47	72	97	122	147	172	197	222	322	343	364	385	406	431	456	481	506	531	556	581	606
23	48	73	98	123	148	173	198	223	323	344	365	386	407	432	457	482	507	532	557	582	607
24	49	74	99	124	149	174	199	224	324	345	366	387	408	433	458	483	508	533	558	583	608
25	50	75	100	125	150	175	200	225	325	346	367	388	409	434	459	484	509	534	559	584	609

If you would like your name placed on MODERN MACHINE SHOP mailing list, initial here \_\_\_\_\_

Your request on this card will be processed immediately in our office on the latest electronic equipment.

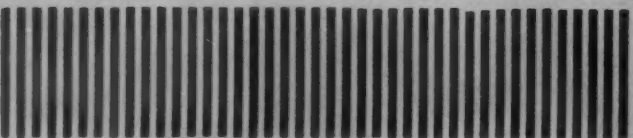
**FIRST CLASS**  
PERMIT No. 1702  
CINCINNATI, OHIO

**BUSINESS REPLY MAIL**  
*No Postage Stamp Necessary if Mailed in the United States*

POSTAGE WILL BE PAID BY—

**modern  
machine  
shop**

431 MAIN ST.  
CINCINNATI 2, OHIO





## NEW! BI-TIP OIL HOLE DRILL

**Replaceable Two Flute Tips Reduce Costs; Single Flute Body Assures Maximum Chip Clearance**

**1** Two flute replaceable tips are available in carbide tipped, solid tungsten carbide, or solid high speed steel. After repeated sharpenings have expended usable cutting tip area, a new tip can be brazed to undamaged body at a fraction of original drill cost.

**2** Single flute body has margin and land for high durability. Design of single flute body assures maximum chip clearance that is especially effective in deep hole drilling of aluminum.

**3** Two coolant holes in every Bi-Tip drill—regardless of drill diameter ( $\frac{3}{16}$ " to 1"), there are two coolant holes for even and constant flow of coolant to cutting lips. Two hundred pounds pressure is more than sufficient—do not need any special oil—just ordinary soluble solution.

**4** Single pass deep hole drilling—advanced design concepts plus the high quality materials and workmanship found only in *Bi-Tip* drills permit drilling the entire depth of a hole with one pass. Cutting lips remain cool, rapid chip removal is inherent, and drilling time is greatly reduced.

**5** This drill is especially designed for aluminum . . . and will drill at speeds and feeds never before dreamed of. But it will perform very well in cast iron, bronze, and even in steel.

At Detroit Reamer & Tool Company are engineering specialists and testing facilities available for solving your drilling problem—we welcome inquiries regarding unusual drilling applications.

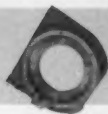
For further information concerning the high performance characteristics and unusual cost reduction features of Bi-Tip drills, write to:

**DETROIT REAMER  
& TOOL COMPANY**

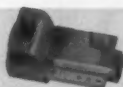
P.O. BOX 174 • BIRMINGHAM, MICH.



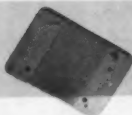
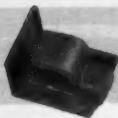
For more data circle 337 on Postpaid Card



*Drill — ream — tap — counterbore — mill all of these*







*jobs and many more without once changing tools*



## Drilling Department in One Machine

### **Reduce Drilling Costs 300 to 600%**

Why take time out to change tools? All the tools you need for dozens of different jobs (like those above) are housed in the 32 spindles of the Fosmatic Turret Drill. You can drill, tap, ream, or mill in rapid sequence with this versatile machine tool.

### **Maintain Firm Production Control**

With the Fosmatic Turret Drill you know your costs before you start a job. Cycling time is pre-planned. The variables of speeds and feeds, the absolutes of dimensions are all pinned down in the tape. You even know tape preparation time — it averages one minute per operation from blueprint to punched and proved tape.

### **Eliminate Jigs and Fixtures**

Now a simple, 8-channel paper tape does the work of costly tooling. Table and saddle motions, spindle selection, speeds and feeds on the Fosmatic Turret Drill are numerically controlled by a General Electric Mark II system. Fosdick's own Fosmatic system controls spindle depth and traverse. These are numerical control systems you can depend on.

You'll want more information on this remarkable new machine. Write for Bulletin FTD — and get a proposal from Fosdick.

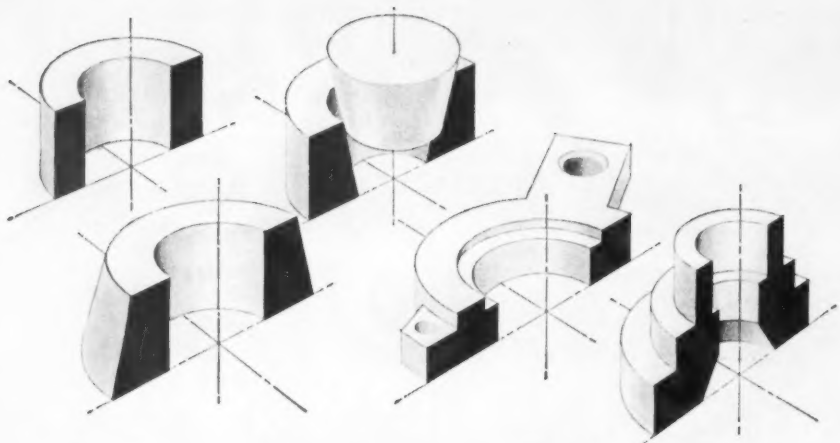
The Fosdick Machine Tool Co., Cincinnati 23, Ohio

# FOSDICK

For more data circle 338 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 35



## when to consider Vertical Grinding

A simple test you can try for yourself quickly determines whether you should consider the Springfield principle of vertical grinding. Try it!

### CHECK YOUR ANSWERS TO THIS QUIZ

YES NO

- |   |                          |                          |
|---|--------------------------|--------------------------|
| 1. Do you grind holes 4" in diameter and larger?            | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Do you grind taper holes or mating parts?                | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Do you grind on irregular shaped work?                   | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Do you grind O.D. or I.D. shoulders, offsets, undercuts? | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Do you grind pieces requiring extreme concentricity?     | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Do you require a 5 micro-inch or better finish?          | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Do some of your grinding jobs require many setups?       | <input type="checkbox"/> | <input type="checkbox"/> |

If you answer yes to three or more questions, a Springfield vertical universal grinder probably can save real time and money in your plant. Mail the coupon today for your free and informative copy of "Vertical Universal Grinders"; Bulletin 197-F.

THE SPRINGFIELD MACHINE TOOL CO., SPRINGFIELD, OHIO



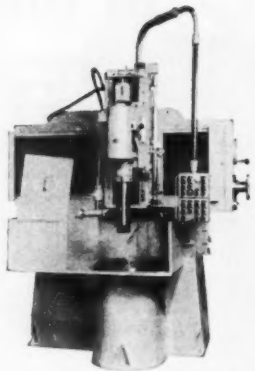
# SPRINGFIELD

name & title \_\_\_\_\_

company \_\_\_\_\_

address \_\_\_\_\_

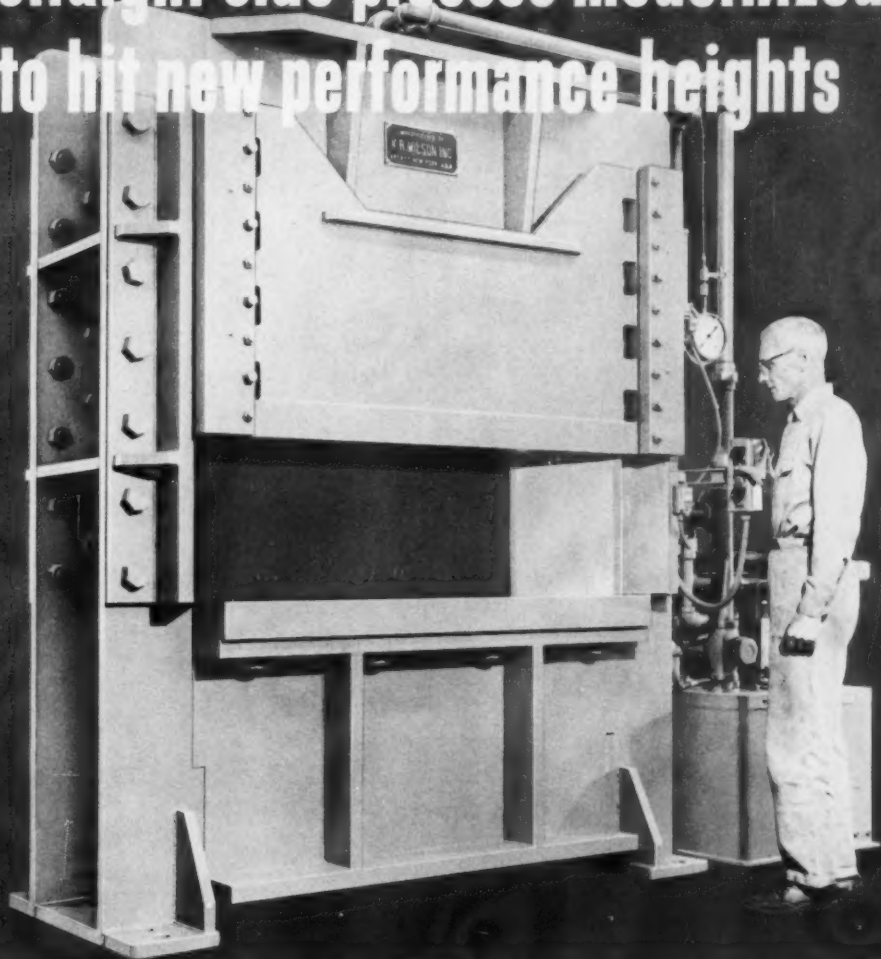
city, state, zip \_\_\_\_\_



Above is a standard Springfield 2A-TR vertical universal grinder. It swings 25°; the grinding head has a 21" stroke and it grinds holes to a nominal depth of 18". The head can be tilted 45° in either direction. Electro-hydraulic control is standard with pendant pushbuttons. The Model 2A-TR costs less than most horizontal chucking grinders of comparable size; it can do the same work plus a wide variety of jobs that just can't be done on a horizontal. Gravity works for you in vertical grinding.

For more data circle 339 on Postpaid Card

# straight side presses modernized to hit new performance heights



Here's smooth hydraulic action at its best! Newly modernized, the KRW 25-1000 ton line of straight side, single action presses offers you the most profitable answer to a wide range of work: bending, forming, blanking, briquetting, broaching, coining, embossing, forging, straightening and trimming.

Boasting clean-cut, neat exteriors, these versatile machines have been engineered to improve productivity... *quantity-wise, quality-wise and dollar-wise!*

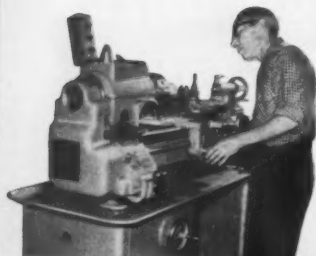
KRW's rugged, welded frame construction is unequalled for strength and rigidity. Members are keyed and fitted together to insure precision performance. Angle gibs, located at each corner of the sliding platen, maintain platen-to-bed parallelism to make utmost accuracy and longer die life a certainty.

Available with either up-acting or down-acting platens, KRW Straight Side, Single Action Presses can be outfitted with manual lever or electric push buttons for single or continuous cycling. Compact, easy-to-adjust and fully responsive, KRW hydraulic systems assure instant, complete press control.

More detailed information (including specs) can be obtained by writing for illustrated Bulletin 5-B. K. R. Wilson, Inc., 216 Main St., Arcade, N. Y.

## KRW HYDRAULIC PRESSES

For more data circle 340 on Postpaid Card



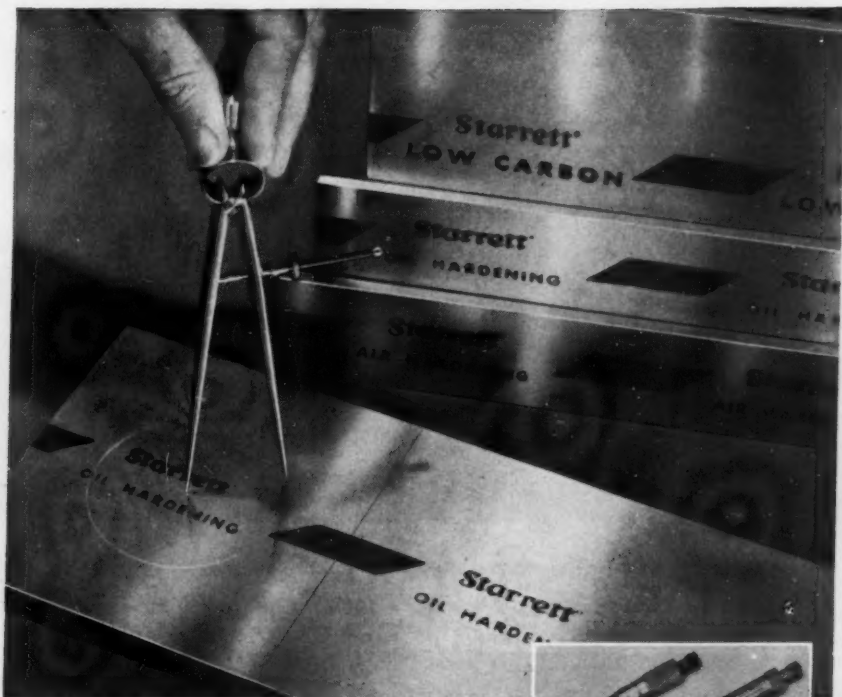
## You can do more with DELTA Metal Lathes

Checking closely on tolerances, time and dollars? These accurate, versatile, low-cost machines can pay their way on your jobs. To see a Delta Metal Lathe in action, write for the name of your nearest Delta Lathe Dealer and get a **FREE CATALOG**: Rockwell Manufacturing Company, Power Tool Division, 606C N. Lexington Avenue, Pittsburgh 8, Pa.

DELTA INDUSTRIAL TOOLS  
another fine product by  
**ROCKWELL** 

For more data circle 341 on Postpaid Card





PRECISION GROUND DIE AND FLAT STOCK — Starrett No. 406 Oil Hardening, No. 407 Air Hardening and No. 408 Low Carbon Flat Stock.

## precision made by **Starrett®** to speed precision work

Flat stock and die stock made to exacting Starrett metallurgical specifications . . . precision ground to Starrett standards of dimensional accuracy . . . available in well over 1,000 sizes in air, oil and water hardening tool and die steel types and in free machining-low carbon flat stock . . . available through your nearby Industrial Supply Distributor ready to lay it out and cut it out.

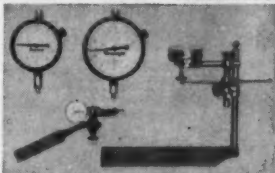
Just one of the many ways Starrett helps you speed and simplify precision work with a complete line of products of unsurpassed quality. Write for complete Catalog No. 27. Address Dept. D, The L. S. Starrett Company, Athol, Mass., U. S. A.

*World's Greatest Toolmakers*



PRECISION TOOLS

DIAL INDICATORS AND BASES



HACKSAWS, HOLE SAWS, BAND SAWS, BAND KNIVES



For more data circle 342 on Postpaid Card

—angles

—tapers

—contours

LeBlond  
Tape-  
Turn

## FULL NUMERICAL CONTOUR

- solid state circuitry • no computer needed
- no hydraulics and heat exchangers
- no vacuum tubes • no templates





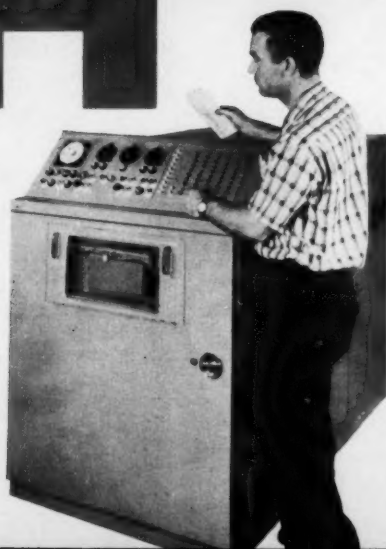
—plunge cuts

—facing cuts

—straight cuts

—radii

# TURNING



Slopes, curves, straight cuts, angles, radii, tapers, facing cuts, boring cuts — you name it, this new LeBlond Tape-Turn Lathe can do it. And without steps, apologies, or a computer.

LeBlond Tape-Turn Lathes are all heavy-duty models with a special headstock and carriage engineered for General Electric's new Mark Century tape control. This potent combination can easily cut tracer turning time by half.

Here's all the stamina, power, and versatility you need for production work, coupled with the simplest contouring control yet developed. Uses 8-channel paper tape just like common positioning controls.

Requires only a sine-cosine table for programming slopes, and no special aids for straight cuts or curves. The console is equipped with a pushbutton keyboard for overriding the taped program.

Continuous path control — no steps. Screw cutting mechanism and control provision for curves with radii greater than 10" available on special order.

Ask a LeBlond representative today for a demonstration on one of your turning jobs. With LeBlond you cut with confidence.

The R. K. LeBlond Machine Tool Co.

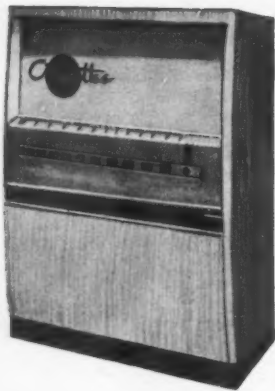
Madison at Edwards Roads, Cincinnati 8, Ohio



For more data circle 343 on Postpaid Card



## REMEMBER?



'Twas a time when the cigar store Indian was a red-hot salesman. Years ago, true, but don't underestimate his selling power. He was good.

Today's parallel is the popular mechanical vending machine, used in selling so many items. As with any salesman, the more economical his cost, the greater the profits. To manufacturers of vending machines Wiedemann Turret Punch Presses offer a way to cut piercing costs 60% to 90%.

One manufacturer of vending machines placed his product on the market in April instead of a contemplated September date, at phenomenal savings in permanent tooling. The "Wiedemann Method" eliminated their usual problems in modifying hard tooling to keep up with the engineering changes.

Metal fabricators of components for similar equipment in every industry can realize the same savings. For, wherever there is need for accurate locating and producing openings in sheet metal, plates and many laminated materials, to customers' designs, the "Wiedemann Method" sets a new standard for short run piercing.

Time studies of your work will show you how a Wiedemann Turret Punch Press will materially cut your piercing costs and increase your production efficiency.



*From the versatile 150 ton R-15 down to the hand operated R-2, there's a Wiedemann for your short run piercing requirements.*

# WIEDEMANN

**WIEDEMANN MACHINE COMPANY**  
Dept. MM3 Gulph Road • King of Prussia, Pa.

For more data circle 344 on Postpaid Card

## Accuracy of Positioning

### Longitudinal Travel:

Greatest error in any inch ..... 15 millionths  
Greatest error in any 18 inches ..... 35 millionths

### Cross Travel:

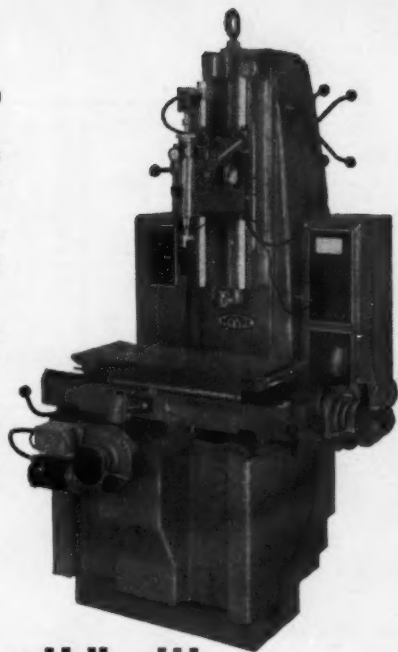
Greatest error in any inch ..... 15 millionths  
Greatest error in 11 inches ..... 35 millionths

### Squareness:

Compound slide ..... 20 millionths  
Travel, spindle housing ..... 50 millionths in 17"  
Travel, spindle ..... 30 millionths in 2 1/4"

### Spindle Axis:

Runs true ..... within 3 millionths



# These users measure to one-third of a "tenth" with Moore Universal Measuring Machine

The tolerances shown at the top of this page will be proven in front of you before final acceptance of the machine, as it was with each customer shown at right.

These users will also attest to the advantages of this machine: its capacity for ultra-precise measuring and inspecting of larger workpieces; the choice of an electronic indicator supported on an accurate, rotatable spindle, or a universal microscope for pickup; a combination of rectilinear and angular positioning, making possible the measurement of the most complex contours. All ways are hardened, ground and lapped steel, fitted to hand-scraped cast iron. Table positioning in two directions of travel is by means of master lead screws. Note motorized lead screw drive, offered as optional equipment.

*Write today for complete details.*

**MOORE SPECIAL TOOL COMPANY, Inc.**  
730 Union Avenue, Bridgeport 7, Conn.

Sperry Gyroscope Division, Sperry Rand  
Mineola, New York  
Eonic, Inc. .... Detroit, Michigan  
Dow Chemical Company .... Rocky Flats, Colo.  
Massachusetts Institute of Technology  
Cambridge, Massachusetts  
DeVlieg Machine Company .... Royal Oak, Mich.  
Douglas Aircraft Co., Inc. .... Charlotte, N. C.  
AC Spark Plug Division, General Motors  
Milwaukee, Wisconsin  
Sangamo Electric Company .... Springfield, Ill.  
University of California .... Los Alamos, N. M.  
Raytheon Manufacturing Company  
Andover, Massachusetts  
Kollsman Instrument Corporation  
Elmhurst, New York  
A. C. F. Industries, Inc. .... Albuquerque, N. M.  
General Electric Company .... Richland, Wash.  
Naval Ordnance Plant  
South Charleston, W. Virginia

Catmur Machine Tool Corp., Ltd. .... England  
North American Aviation, Inc.  
El Segundo, California  
University of California .... Livermore, Calif.  
Bendix Aviation Corporation .... Kansas City, Mo.  
Chandler Evans Corporation .... Hartford, Conn.  
Mason & Hanger-Silas Mason Co., Inc.  
Amarillo, Texas  
International Business Machines Corp.  
Owego, New York  
Union Carbide Nuclear Co. .... Oakridge, Tenn.  
University of California .... Livermore, Calif.  
\*General Electric Company .... Schenectady, N. Y.  
\*Dow Chemical Company .... Denver, Colorado  
\*Bendix Aviation Corporation  
Kansas City, Kansas  
Federal Products Corporation  
Providence, Rhode Island  
\*Union Carbide Nuclear Co. .... Oakridge, Tenn.  
\*REPEAT ORDER

## ADD TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • MEASURING MACHINES • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES  
For more data circle 345 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 43

## how's this for high-speed hobbing?

WORK PIECE					HOB (1 start)				Pieces per Load	Method*	Time per Piece	Pieces per Grind	Cut
Dia. Pitch	No. of Teeth	Helix Angle	Face Width	Material	Dia.	RPM	Feet PM	Feed					
10	20	15°	1 1/4"	1040 leaded	3"	500	395	.055"	1	A	2 min. 25 sec.	150	Finish
7	23	13°	3/4"	8620	4"	350	370	.100"	2	A and B	59 sec.	240	Pre- shave
5	43	24°	1 5/8"	8620	4"	280	300	.100"	2	B	3 min. 45 sec.	80	Pre- shave

\* Method A: Diagonal Hobbing. Method B: Step-by-step Hobbing.

## This is the kind of performance you get with THE FELLOWS-PFAUTER P400 HIGH-SPEED HOBGING MACHINE

**HIGH-SPEED HOBGING.** Performance speaks louder than words. The examples given above show the results of high-speed hobbing which can cut costs. The figures are taken from the records of typical production runs on the Fellows-Pfauter P400.

**DESIGN.** The P400 was designed for High-Speed Hobbing, and it features a new basic design. The individual machine elements are of maximum rigidity. The hob head is heavy and rugged, the machine column and bed are of double-wall construction with heavy V-ways and the work table is as large as the maximum permissible work piece diameter. The index worm gear is nearly as large as the work table, and the work support column is of massive construction. All parts of the machine are properly proportioned and of sturdy design to eliminate vibration. The cost is more than justified by the resulting reductions in hobbing times and the increased hob life.

**RIGIDITY and CLOSE TOLERANCES.** The large size work table and index worm gear and the oversize hob head, which eliminates lead errors caused by hob breakout, are important

factors in providing the rigidity necessary to hold work to close tolerances.

**COMPLETELY OPEN WORKING AREA.** The machine and the work-support columns are of such rigid construction that the hobbing stresses are absorbed without requiring an over-arm. Therefore the working area is easily accessible for set-up and work loading. The automatic retraction of the table from the hob also facilitates changing of work.

**SET-UP TIMES and FLOOR-TO-FLOOR TIMES** are reduced on the P400 because it has infinitely variable speeds and feeds, rapid traverses for all machine movements, including hob shifting manually by push button, and built-in hydraulics for the operation of the tailstock and simple hydraulic fixtures used on this machine.

**AUTOMATION** on the P400 is simple and fast. The illustrations show a machine equipped with automatic loading and unloading devices.

**GEAR HOBGING COSTS** can be cut by high-speed hobbing on a P400 because of the resulting savings in production time, floor space, maintenance and labor.



THE  
PRECISION  
LINE

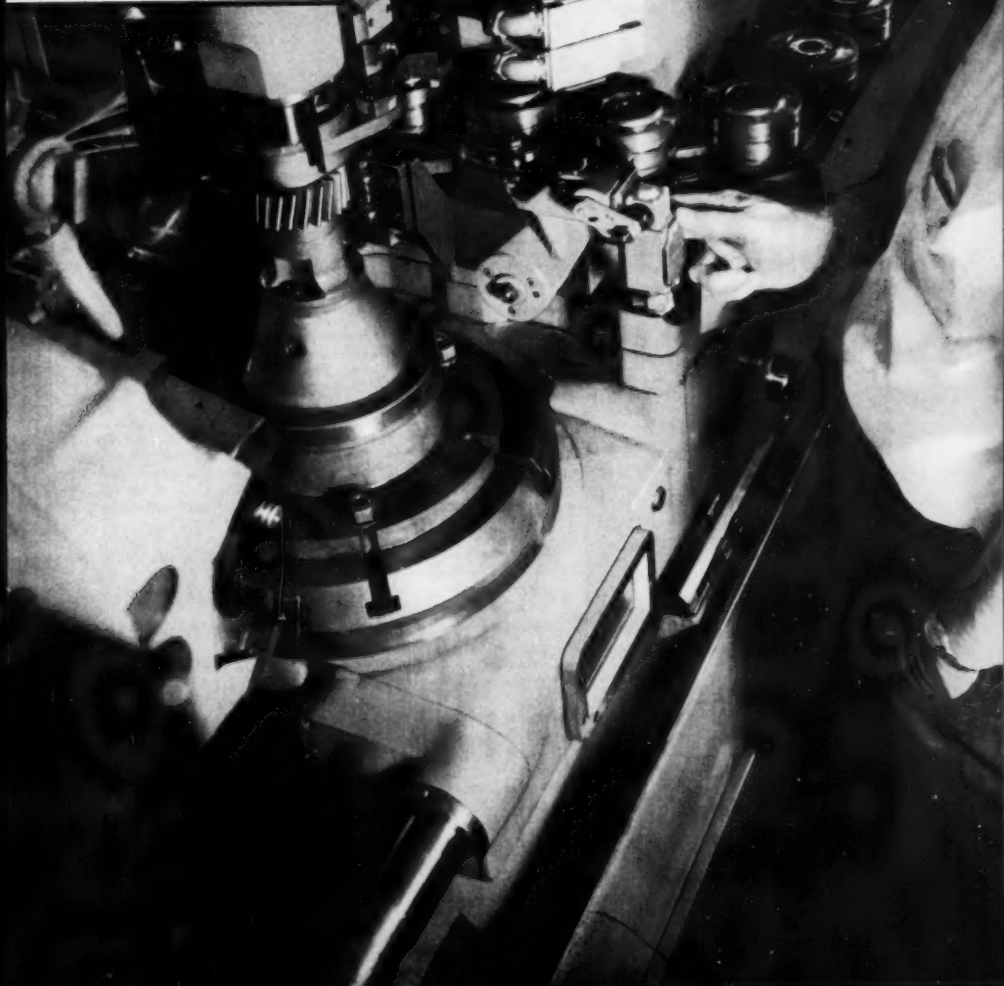
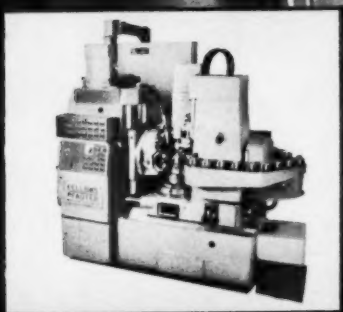
*Fellows*

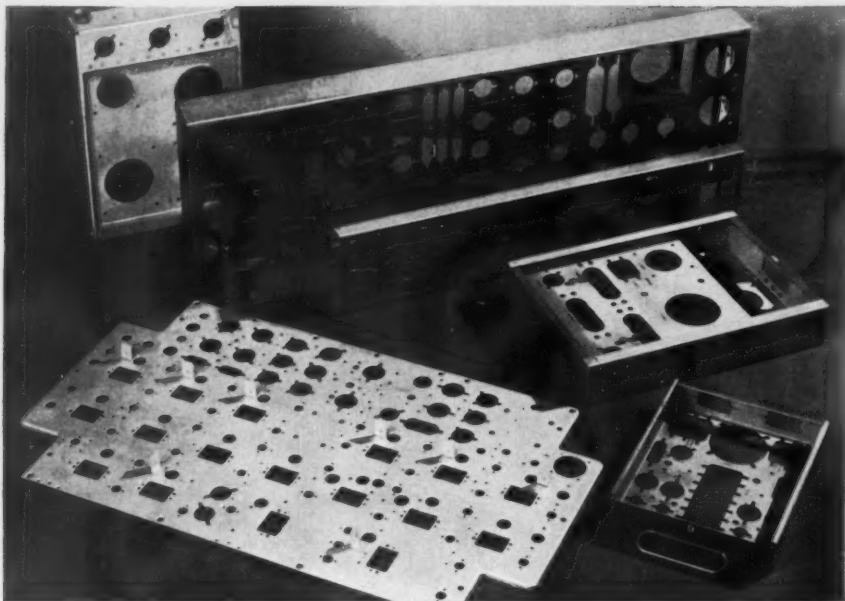
*Gear Production Equipment*

THE FELLOWS GEAR SHAPER COMPANY 78 River Street, Springfield, Vermont, U.S.A.

Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.  
150 West Pleasant Ave., Maywood, N.J.  
5835 West North Avenue, Chicago 39  
6214 West Manchester Ave., Los Angeles 45

For more data circle 346 on Postpaid Card





## PUNCH COMPLICATED PATTERNS FAST



With the new improved STRIPPIT 15-A Fabricator, complicated patterns of round and shaped holes can be produced quickly and accurately in sheet material. A high speed punch press that enables you to produce finished pieces directly from drawings, the versatile STRIPPIT 15-A eliminates slow "in-between" tool designing and die making... saves you days or even weeks of valuable time.

The STRIPPIT 15-A features a unique multiple-stop gauging system for positioning work to exact layout specifications. Punches and dies... within easy reach in built-in file drawers... can be switched from one size to another in less than 20 seconds. Designed especially for prototype and short production runs, the STRIPPIT 15-A is easily converted to a high speed production punching unit with the STRIPPIT Duplicator.

### The STRIPPIT 15-A:

- **PUNCHES** any round or shaped hole up to  $3\frac{1}{2}$ " diameter. Maximum material thickness is  $\frac{1}{4}$ ".
- **NOTCHES** 90° corners—rectangular, radii, vee and special shape edge notches—up to  $\frac{1}{8}$ " capacity in mild steel.
- **HIBBLES** straight line or contour shearing up to 38" diameter circle, at 165 strokes a minute,  $\frac{1}{8}$ " mild steel.

Send now for 15-A catalog. Free demonstration can be arranged right in your plant.

WALES **STRIPPIT** INC.

207 Buell Road • Akron, New York

*In Canada: Strippit Tool & Machine Company, Brampton, Ontario*

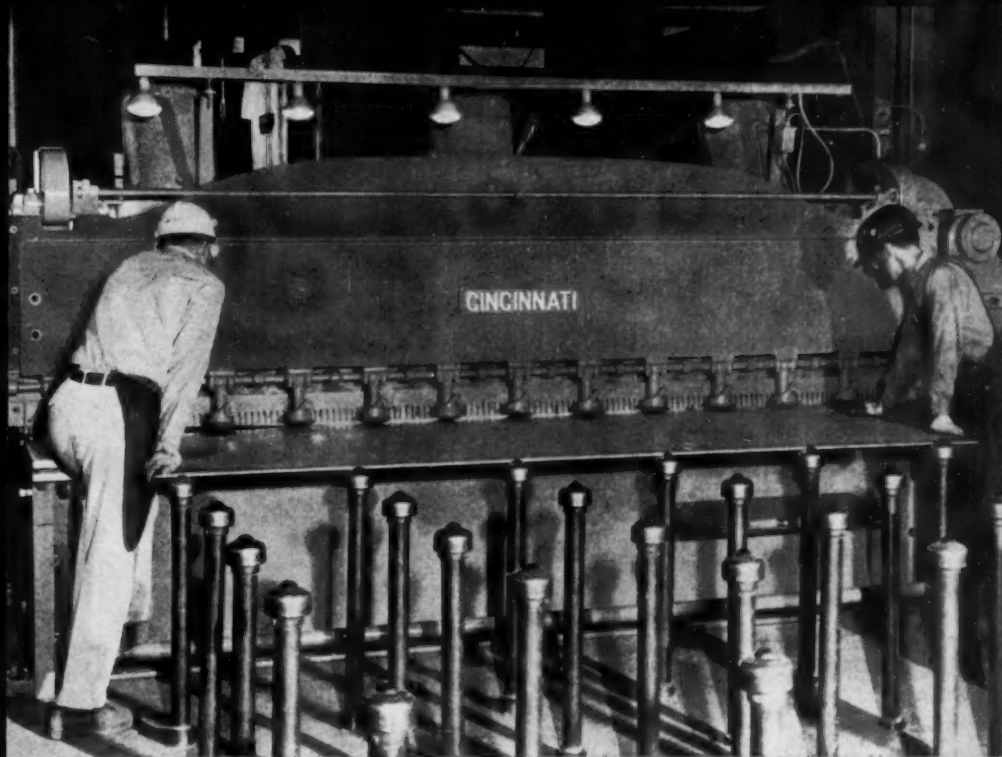
*In Continental Europe: Raskin, S.A., Lausanne, Switzerland*

*In the British Isles: E. H. Jones (Machine Tools) Ltd., Hove, Sussex, England*



For more data circle 347 on Postpaid Card





*Courtesy Bannock Steel Company*

# Maintenance negligible

## ON 6 YEAR OLD CINCINNATI® SHEAR

"We have had this Cincinnati Shear in almost constant operation for something over six years," says S. L. Cate of Bannock Steel Company, Pocatello, Idaho, "and, to date, maintenance costs have been almost negligible. We certainly feel this is truly a remarkable performance."

Bannock Steel Company recently installed a new Cincinnati Hydraulic Press Brake—clear evidence of their confidence in the Cincinnati line. See our insert in Sweet's Machine Tool file.

**THE CINCINNATI SHAPER co.**

Shapers / Shears / Press Brakes Cincinnati 11, Ohio, U. S. A.

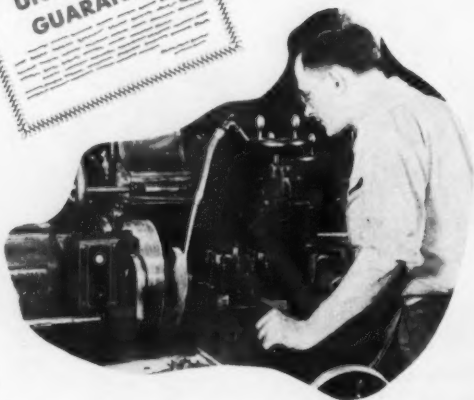


In Scotland: The Cincinnati Shaper Co., Ltd., Glasgow

For more data circle 348 on Postpaid Card

# here's the one **SOLUBLE CUTTING LUBRICANT that WON'T GO RANCID**

**UNQUALIFIED  
GUARANTEE**



**and it's backed by an UNQUALIFIED GUARANTEE**

We absolutely GUARANTEE that MACCO 472 MPA will not turn rancid under any circumstances. We are the only manufacturer of soluble cutting lubricants who can make this Guarantee.

## IT'S **MACCO 472 MPA**\*

Ideal for MACHINING ALL METALS ON ALL TYPES OF EQUIPMENT

### **THERE'S NOTHING ELSE LIKE IT!**

Hard to believe? You bet! But, it's a fact—backed by experience. One plant with hundreds of machines down 70 days, another 116 days, still another for 6 months (names will be furnished on request)—all started up with the same MACCO 472 MPA solution that was in use when they shut down, and ABSOLUTELY NO TRACE OF RANCIDITY IN ANY MACHINE!

With vacation shutdowns coming now is the time to make the change to MACCO 472 MPA. Save yourself a lot of headaches, and some hard earned maintenance dollars to boot. Write or Phone Today for a Macco engineer. He'll give you facts, and make it possible for you to prove for yourself why MACCO 472 MPA is today's No. 1 soluble cutting lubricant in plant after plant. When vacation is over you'll start up with no worry . . . NO RANCIDITY!

*And, in addition,  
**WE GUARANTEE  
TO INCREASE  
YOUR TOOL LIFE  
25%, or more!***

\*An Exclusive Development

**THE METALWORKING INDUSTRY LOOKS TO MACCO FOR LEADERSHIP**

472 MPA is one more of many reasons why



For more data circle  
349 on Postpaid Card

**MACCO**  
PRODUCTS COMPANY

9203-mm S. SANGAMON ST., CHICAGO 20, ILLINOIS  
PRESCOTT 9-0800

**Transform your stubborn mule  
to a prime mover**



**PROVED...  
TURRET LATHE AUTOMATION**

**by Acme  
HYDRIVE**

Hydrive transforms older turret lathes from limiting factors to high volume producers! Technical management is being stimulated to machine tool re-evaluation in view of the proved success of automating turret lathes with Hydrive. Stepping up manual turret lathes to automatic operation—easily capable of tripling output—will multiply your capacity at surprisingly low cost. Without the substantial expenditure of new equipment, management reaches increased production goals . . . with wanted accuracy and reliability.

Write today for complete Hydrive information . . . how Hydrive will make your turret lathe far more productive. Also available upon request, FREE Hydrive film.

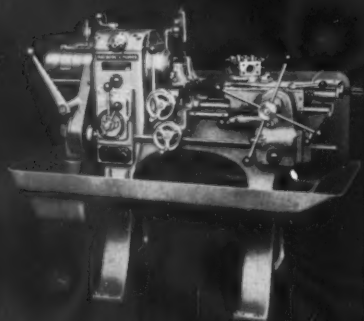
**ACME INDUSTRIAL COMPANY**

**200 North Laflin Street/Chicago 7, Illinois**

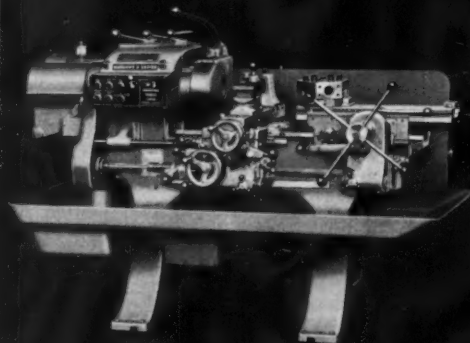
For more data circle 350 on Postpaid Card



**KENT-MOORE  
KEEPS MODERNIZATION PROGRAM  
ON SCHEDULE...**



Two No. 2 Geared Electric Turret Lathes



Six No. 3 Universal Turret Lathes

**ADDS 8 NEW BARDONS & OLIVER  
TURRET LATHES DURING LAST SEVEN YEARS**

Why does the world's largest manufacturer of special automotive service tools consistently select Bardons & Oliver Turret Lathes? We asked K/M's plant engineer, A. S. Adamczyk and he stated as follows:

"We specified B & O Lathes because:

From past experience, we know they set-up quick, adapt easily to our needs, and require little maintenance.

Our operators prefer their simplified, properly placed controls, short turret-index motion, easily moveable tool-carrying units—and best of all, their ability to hold exacting tolerances.

They consistently cost less than other turning equipment in both initial investment and modification expenditures necessary to adapt them to our special needs.

In short, Bardons & Oliver Lathes meet our most demanding requirements and we are 100% satisfied with their performance."

For detailed information on the complete line of B & O machines, call the Bardons & Oliver representative in your area or write directly to our home office.

Bardons & Oliver, Inc., 1133 West 9th Street  
Cleveland 13, Ohio

**LATHE OPERATIONS  
AT  
KENT-MOORE**

Using a two-shift (16 hours) daily operation, over 5,000 different jobs are handled each year, 200 of which are entirely new projects. Parts are machined from a wide variety of materials, brass to high-alloy steels, in lot sizes from 25 to 7500 pieces. In some cases tolerances of  $\pm .0005$  are required.

**BARDONS & OLIVER**

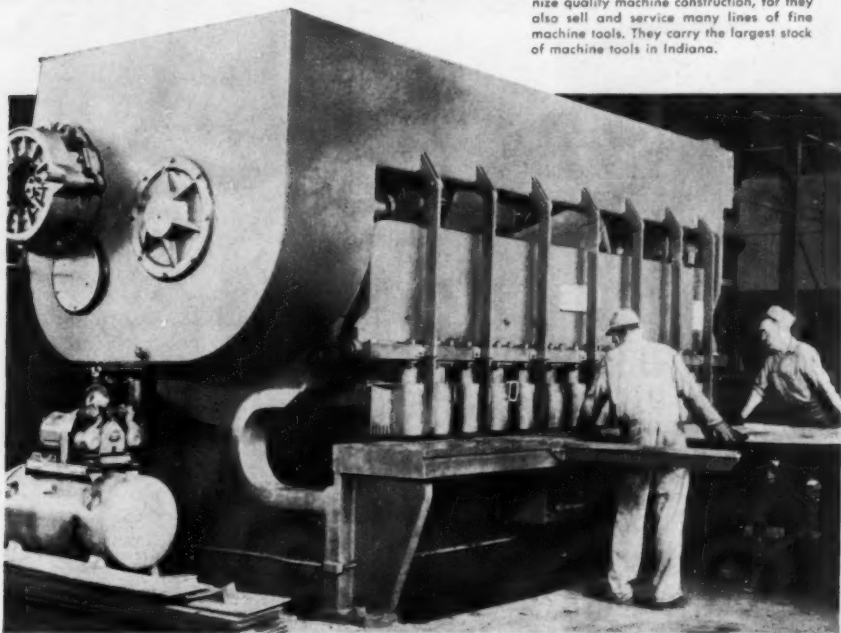
For more data circle 351 on Postpaid Card

*Manufacturers of Turret Lathes and Cutting-Off Lathes*

# STEELWELD SHEAR ENABLES STEEL WAREHOUSE TO PROVIDE DELUXE SERVICE

**Indianapolis Supplier Cuts Plates To Suit Customers' Needs EXACTLY**

This Steelweld Shear is much appreciated at the Indianapolis Machinery Co., Inc. And they should be in a position to recognize quality machine construction, for they also sell and service many lines of fine machine tools. They carry the largest stock of machine tools in Indiana.



**W**ITH a Steelweld Pivoted-Blade Shear that has been operated continuously in its steel warehouse since 1953, the Indianapolis Machinery Co., Inc., Indianapolis, furnishes metal cut to exactly meet its customers' requirements.

This usually means thicknesses from 3/16 to 3/4 inch, widths varying from a few inches to 12 feet and lengths to the maximum available from the mills. The metal may be mild steel, stainless or any of a number of special alloys. Whatever the metal or thickness, the cuts are straight and accurate with negligible burr, because the knife clearance is always adjusted to produce the best results.

Some orders call for strips of type 304 stainless, 5/16 and 3/8 inch thick by 1 1/4 and 2 1/4 inch wide. Others call for hard abrasive-resisting steel in strips 3/8 by 2 and 2 1/4 inches. Because of the shear's very low knife rake angle, such items are made with extremely little twist, camber and bow.

The air-operated clutch and brake have proven phenomenal by customary shear standards. Despite

the tens of thousands of times the clutch and brake have opened and closed in making as many cuts over the years, the original linings are still in use. The action continues snappy and positive. The machine has its own air compressor mounted on one end.

Considering the large volume of shearing work done, the knife wear has been long and satisfactory. Knife grindings have been at least a year or more apart. This is attributed to not only the quality of the knives, but to the low rake at which they operate and also the correct knife clearance used for all cutting.

Write for free copy of catalog No. 2011

**STEELWELD**  
**PIVOTED**  
**BLADE**  
**SHEARS**



Steelweld Machinery includes: Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

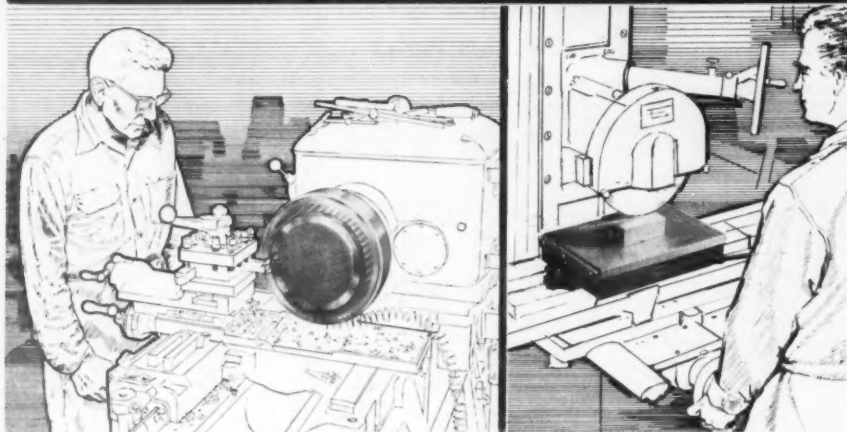
STEELWELD MACHINERY DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 6462 E. 282 ST. • WICKLIFFE, OHIO

For more data circle 352 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 51

# WALKER CERAMAX CHUCKS



## TURNING

Walker, for the first time in machine tool history, offers safe magnetic holding for lathes. Ceramic magnets in Walker Rotary CERAMAX chucks are not subject to electrical power failure and have three times greater coercive force than ordinary Alnico magnets. With uniform holding power over the entire face of the chuck, safe, accurate turning, facing or trepanning is accomplished in a single set-up.

*For dependable, trouble free operation specify Walker CERAMAX Chucks.*

## GRINDING

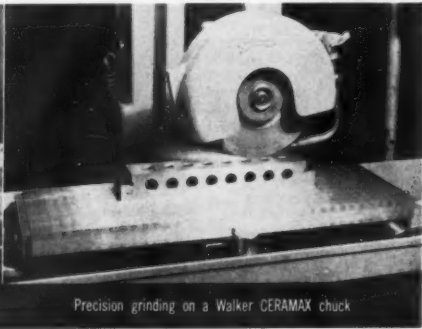
Walker CERAMAX chucks provide all the holding power needed for standard grinding operations and with fine pole divisions are ideal for thin, small work as well as large, heavy pieces. All-steel top plate minimizes redressing to reduce non-productive machine time. Ceramic magnets retain magnetism permanently, eliminate constant recharging.

**O.S. Walker** Co., Inc.  
ROCKDALE ST. • WORCESTER 6, MASS.

*Original Designers and Builders of Magnetic Chucks*



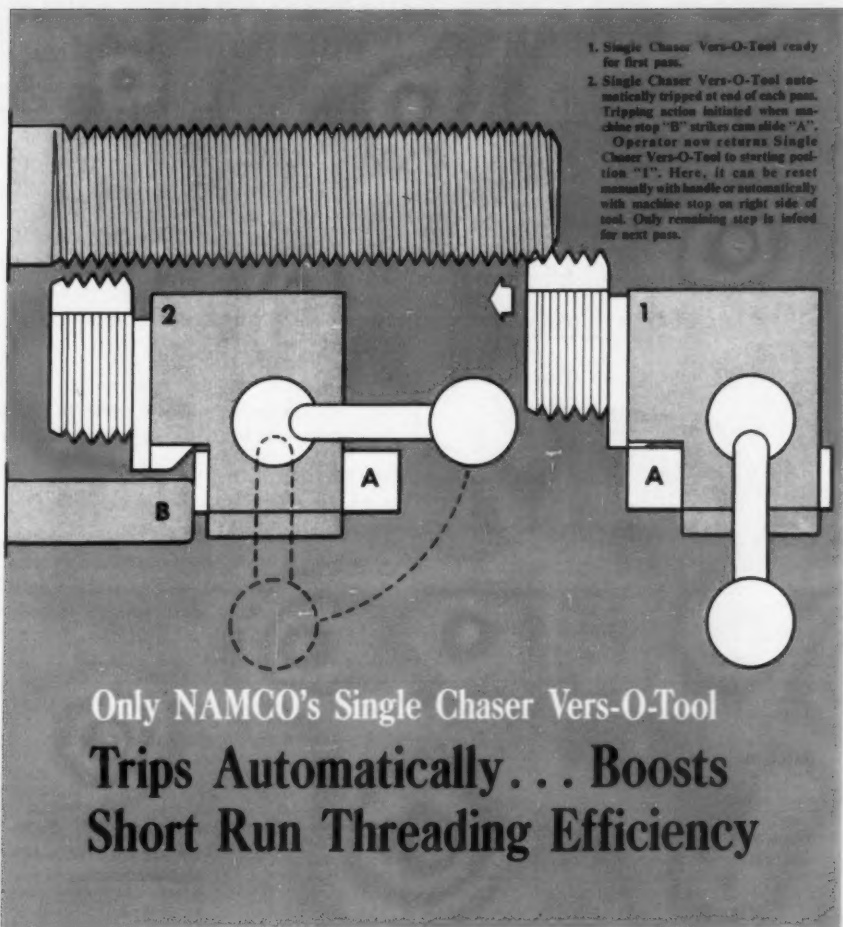
Turning a steel sleeve with a Walker Ceramax Chuck



Precision grinding on a Walker CERAMAX chuck

For more data circle 353 on Postpaid Card





Unlike other single point threading tools, NAMCO's Single Chaser Vers-O-Tool backs off automatically at the end of the cutting stroke. For short runs, this means more threading in less time. And, because it just isn't possible to attempt the return stroke while the tool is still at cutting depth, scrappage is eliminated. The tool's multiple cutting edges mean greater threading accuracy and longer tool life while NAMCO's exclusive resharpener method permits quick tool change and precise reset. In short, *nothing* beats NAMCO's Single Chaser Vers-O-Tool for short run threading efficiency. Get complete details on this and all the rest of NAMCO's complete line of Vers-O-Tools. Write today for our 44 page Bulletin DT-60.



**National  
Acme**

THE NATIONAL  
ACME COMPANY  
182 E. 131st STREET  
CLEVELAND 8, OHIO

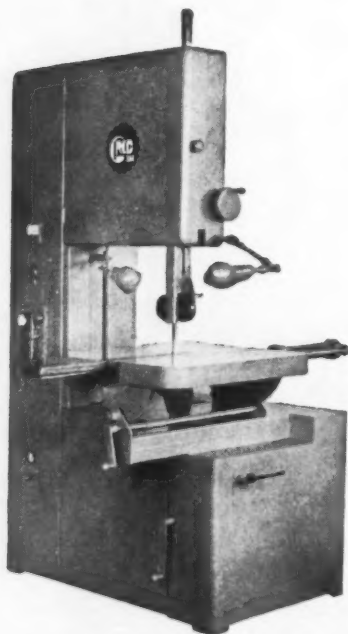
Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.

For more data circle 354 on Postpaid Card

# GROB SPELLS THE DIFFERENCE IN BAND SAW MACHINES

The new GROB 24" universal band saw  
has all the famous GROB features:

*Quality • Efficiency • Durability • Strength  
Utility • Low Maintenance • Reasonable Cost*



- Speeds infinite from 35-12000 FPM covers both cold and hot sawing

- Variable drive 3-speed transmission with precision rolled gears and splines transmits 15 HP

- Hydraulic table feed

See the difference demonstrated in our dealers' showrooms

or

Write GROB INC. for complete specifications

**GROB** also manufactures a complete line of:



**BUTT WELDERS  
FILING MACHINES  
GEAR ROLLING MACHINES**

**GRAFTON, WISCONSIN**

For more data circle 355 on Postpaid Card

NEW SIZES ADDED  
DAILY... IF NOT  
LISTED—  
WRITE

**WHY WAIT?**

## DELIVERY FROM STOCK

**SPECIAL RH & LH**  
**HIGH SPEED**

## TAPS • DIES • THREAD PLUG & RING GAGES



**DEALER  
INQUIRIES INVITED**

**WHEN REQUESTING QUOTATIONS ALWAYS MENTION QUANTITIES**

SIZE	THREADS PER INCH	SIZE	THREADS PER INCH	SIZE	THREADS PER INCH	SIZE	THREADS PER INCH
0000	180	3/16	30-32-36-40-48-56-64-72	5/16	9-10-12-13-14-16-18-20-24-28-32-36-40-48-56-64	1-1/2	7-8-9-10-11-16-18-20-24-28-32-36-40-48-56-64
00	90-96-112	13/64	24-28-30-32-36-40	41/64	11-18-24-32	1-7/8	7-13-16-18-20
0	56-64-72-76-80-90	7/32	20-22-24-26-28-30-32-36-38-40-56-64-72	21/32	10-11-18-20-24-27-32-40-48	1-17/32	6-8-10-12-14-16-18-20-24-28-32-36-40-48-56-64
1	56-64-72-76-80-90						
2	64-52-54-56-62-70-80-94	22/7	24	11/16	10-12-14-16-18-20-22-24-26-27-28-30-32-36-40	1-5/8	5-5 1/2-6-8-10-11 1/2-12-13-14-16-18-20-24-28-32-40
3	64-52-54-56-64-72-80	15/64	20-22-24-26-28-30-32-36-40-48	23/32	11-12-16-18-20-24-27-32-36-40	1-11/16	5-6-8-10-12-14-16-18-20-24-28-32-36-40
4	62-54-56-64-72-80-90	1/4	10-12-14-16-18-20-22-23-24-25-26-27-30-32-36-40-48-50-56-64-72-80	47/64	10-12-16-18-20	1-3/8	5-6-8-10-12-16-18-20
5	62-54-56-64-72-80-90	1/4	10-12-14-16-18-20-22-23-24-25-26-27-30-32-36-40-48-50-56-64-72-80	3/4	6-8-9-11-12-14-15-18-20-22-24-26-28-30-32-36-40-48-50-56-64	1-7/8	5-6-8-10-12-13-14-16-18-20-24-28-32-40
6	64-28-30-36-38-42-44-48	17/64	12-18-20-24-26-27-28-32-40	49/64	10-16-18-20	1	7-17-18
7	28-30-32-34-36-38-40-44-48-56	9/32	16-18-20-24-26-27-28-32-40	25/32	10-16-18-20	1-1/8	5-6-8-10-12-14-16-18-20-24-28-32-36-40
8	64-28-30-36-38-40-44-48-56	19/64	12-18-20-24-26-27-28-32-40	800	16	1	7-17-18
9	64-28-30-36-38-40-44-48-56	3/16	10-12-14-16-18-20-24-27-32-40	13/16	10-12-14-16-18-20-24-27-32-40	1-2/8	5-6-8-10-12-14-16-18-20-24-28-32-36-40
10	64-28-30-36-38-40-44-48-56	5/16	10-12-14-16-18-20-22-26-27-28-30-32-36-40-48-50-56-64	835	16	1-15/16	5-6-8-10-12-14-16-18-20-24-28-32-36-40
11	64-28-30-36-38-40-44-48-56	21/64	16-18-20-24-26	27/32	9-10-18-20-24-27-32-40-48	2-1/16	4-6-8-10-12-14-16-18-20-24-28-32-36-40
12	62-54-56-64-72-80-90-96	11/32	12-18-20-24-26-27-28-32-40	850	14	2-1/8	4-6-8-10-12-14-16-18-20-24-28-32-36-40
13	64-56-60-64-72-80-90	23/64	16-18-20-24-26	29/32	10-12-14-16-18-20-24-27-32-40	2-1/4	4-6-8-10-12-14-16-18-20-24-28-32-36-40
14	64-56-60-64-72-80-90	3/8	10-12-14-16-18-20-22-26-27-28-30-32-36-40-48-50-56-64	15/16	10-12-14-16-18-20-24-27-32-40	2-1/2	4-6-8-10-12-14-16-18-20-24-28-32-36-40
15	64-56-60-64-72-80-90	5/8	10-12-14-16-18-20-22-26-27-28-30-32-36-40-48-50-56-64	31/32	8-9-12-16-18-20-24-28-32-40	2-7/8	4-6-8-10-12-14-16-18-20-24-28-32-36-40
16	64-56-60-64-72-80-90	1/2	12-14-16-18-20-22-24-26-27-28-30-32-36-40-48-50-56-64	1-1/32	8-9-12-16-18-20-24-28-32-40	3-1/8	4-6-8-10-12-14-16-18-20-24-28-32-36-40
17	64-56-60-64-72-80-90	27/64	14-16-18-20-22-24-26-27-28-30-32-36-40-48-50-56-64	1-1/16	8-9-12-16-18-20-24-28-32-40	3-1/4	4-6-8-10-12-14-16-18-20-24-28-32-36-40
18	64-56-60-64-72-80-90	7/16	10-12-14-16-18-20-22-24-26-27-28-30-32-36-40-48-50-56-64	1-1/8	8-9-12-16-18-20-24-28-32-40	3-1/2	4-6-8-10-12-14-16-18-20-24-28-32-36-40
19	64-56-60-64-72-80-90	1/2	12-14-16-18-20-22-24-26-27-28-30-32-36-40-48-50-56-64	1-1/4	8-9-12-16-18-20-24-28-32-40	3-3/4	4-6-8-10-12-14-16-18-20-24-28-32-36-40
20	64-56-60-64-72-80-90	15/32	12-14-16-18-20-22-24-26-27-28-30-32-36-40-48-50-56-64	1-1/8	8-9-12-16-18-20-24-28-32-40	3-1/2	4-6-8-10-12-14-16-18-20-24-28-32-36-40
21	64-56-60-64-72-80-90	31/64	14-16-18-20-22-24-26-27-28-30-32-36-40-48-50-56-64	1-5/8	8-9-12-16-18-20-24-28-32-40	3-1/4	4-6-8-10-12-14-16-18-20-24-28-32-36-40
22	64-56-60-64-72-80-90	1/2	10-11-12-14-16-18-22-24-26-27-28-30-32-36-40-44-48-56-72-80	1-11/16	7-8-10-12-14-16-18-20-24-28-32-40	3-1/8	4-6-8-10-12-14-16-18-20-24-28-32-36-40
23	64-56-60-64-72-80-90	7/32	12-13-14-16-18-20-24-26-27-28-30-32-36-40-44-48-56-72-80	1-3/16	7-8-10-12-14-16-18-20-24-28-32-40	3-1/2	4-6-8-10-12-14-16-18-20-24-28-32-36-40
24	64-56-60-64-72-80-90						
25	64-56-60-64-72-80-90	1/4	10-12-14-16-18-20-22-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/4	8-10-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
26	64-56-60-64-72-80-90	5/16	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-5/16	7-8-10-12-14-16-18-20-24-27-32-40	3-1/8	4-6-8-10-12-16
27	64-56-60-64-72-80-90	3/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-3/8	5-8-10-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
28	64-56-60-64-72-80-90	1/2	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
29	64-56-60-64-72-80-90	5/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
30	64-56-60-64-72-80-90	3/4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
31	64-56-60-64-72-80-90	7/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
32	64-56-60-64-72-80-90	1	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
33	64-56-60-64-72-80-90	1 1/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
34	64-56-60-64-72-80-90	1 1/4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
35	64-56-60-64-72-80-90	1 1/2	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
36	64-56-60-64-72-80-90	1 3/4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
37	64-56-60-64-72-80-90	1 7/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
38	64-56-60-64-72-80-90	2	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
39	64-56-60-64-72-80-90	2 1/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
40	64-56-60-64-72-80-90	2 1/4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
41	64-56-60-64-72-80-90	2 1/2	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
42	64-56-60-64-72-80-90	2 3/4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
43	64-56-60-64-72-80-90	2 7/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
44	64-56-60-64-72-80-90	3	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
45	64-56-60-64-72-80-90	3 1/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
46	64-56-60-64-72-80-90	3 1/4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
47	64-56-60-64-72-80-90	3 1/2	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
48	64-56-60-64-72-80-90	3 3/4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
49	64-56-60-64-72-80-90	3 7/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
50	64-56-60-64-72-80-90	4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
51	64-56-60-64-72-80-90	4 1/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
52	64-56-60-64-72-80-90	4 1/4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
53	64-56-60-64-72-80-90	4 1/2	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
54	64-56-60-64-72-80-90	4 3/4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
55	64-56-60-64-72-80-90	4 7/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
56	64-56-60-64-72-80-90	5	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
57	64-56-60-64-72-80-90	5 1/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
58	64-56-60-64-72-80-90	5 1/4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
59	64-56-60-64-72-80-90	5 1/2	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
60	64-56-60-64-72-80-90	5 3/4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
61	64-56-60-64-72-80-90	5 7/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
62	64-56-60-64-72-80-90	6	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
63	64-56-60-64-72-80-90	6 1/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
64	64-56-60-64-72-80-90	6 1/4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
65	64-56-60-64-72-80-90	6 1/2	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
66	64-56-60-64-72-80-90	6 3/4	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80	1-1/2	8-10-12-14-16-18-20-24-27-32-40	3-1/2	4-6-8-10-12-16
67	64-56-60-64-72-80-90	6 7/8	10-12-14-16-18-20-24-26-27-28-30-32-36-40-48-50-56-72-80</				

**LEFT HAND N.C. (USS)—N.F. (SAE) SIZES**

SEE ABOVE SECTION FOR MORE SIZES

SIZE	THREADS	SIZE	THREADS	SIZE	THREADS	SIZE	THREADS
0	80	8	32-36	7/16	14-20	1	1-1/8 7-12
1	64-72	10	24-32	1/2	13-20	2	1-1/4 7-12
2	56-64	12	24-28	9/16	12-18	3	1-1/4 7-12
3	48-56	14	20-24	5/8	11-18	4	1-5/16 6-12
4	36-40-48	1/4	20-28	11/16	11-16	5	1-3/8 6-12
5	40-44	5/16	18-24	3/4	10-16	6	1-7/16 6-12
6	32-40	3/8	16-24	7/8	9-14	7	1-1/2 6-12

### 'OVERSIZE' and 'UNDERSIZE' TAPS

RIGHT AND LEFT HAND M.C. AND M.F. FIFES

RIGHT AND LEFT HAND R.C. AND R.F. SIZES		
MACHINE SCREW	#2 to #5	Plus or Minus .002, .005, .009
MACHINE SCREW	#6 to #14	Plus or Minus .003, .005, .010
FRACTIONAL	1/4" to 1-1/2"	Plus or Minus .003, .005, .010 .015, 1/64, 1/32

### Right & Left Hand—Unlisted 'Gun' or Spiral Pointed Taps

Size	Threads	Size	Threads
0	80 NF	7/8	9 NC, 14
1	56 NS, 64 NF	1	8 NC, 12-14
2	56 NC, 64 NF	1-1/8	7 NC, 12
9/16	12 NC, 18 NF	1-1/4	7 NC, 12
5/8	11 NC, 18 NF	1-3/8	6 NC, 12
11/16	11 NS, 16 NS	1-1/2	6 NC, 12
3/4	10 NC, 16 NF		

### Rand Hand—Unlisted 'Pulley'

### And Extra Length Taps

Size	Threads	Size	Threads
4	36-40 NC, 48 MF	3/8	24 MF
5	40 NC, 44 MF	7/16	20 MF
6	32 NC, 40 MF	1/2	20 MF
8	32 NC, 36 MF	9/16	12 MF
10	24 NC, 32 MF	9/16	18 MF
12	24 NC, 28 MF	5/8	18 MF
1/4	28 MF	3/4	16 MF
5/16	24 MF	Also Larger	
		Size	NC & MF

UNLISTED  
Right Hand "Pine" Taps

Right Hand Pipe	Left Hand Pipe	EX. LENGTH
"NPT"	"NPT"	

"NPT" 6		"NPT" 6		"NPS" 6	
Size	Thread	Size	Thread	Size	Thread
1/16	27	1	8		
1/4	27	1-1/4	11 1/2	1/16	27
1-1/2	8	1-1/2	11 1/2	1/8	27
	8	2	11 1/2	1/4	27
	8	2-1/2	8	1/4	18
1-1/2	8	3	8	3/8	18
	8	3-1/2	8	1/2	14
	8	4	8	3/4	14
Also British		Also British		1	

### Left-hand 'Pipe Taps'

### Curved and Straight

Size	Thread	Size	Thread
1/16	27	1	11½
1/8	27	1-1/4	11½
1/4	18	1-1/2	11½
3/8	18	2	11½
1/2	14	2-1/2	8
3/4	14	3	8
		3-1/2	8

Also British

## ACME TAPS IN STOCK

**IF NOT IN STOCK—7 to 10 DAYS DELIVERY—**When ordering or requesting quotations, kindly furnish following information:

- (a) Kind of material being machined.
- (b) Depth of hole in inches, through or bottom.
- (c) Tap to be used horizontally or vertically.
- (d) Will tap turn, or is piece expected to be turned.
- (e) Is tapping job expected to be done in one pass.
- (f) Would tap be backed out of hole, or machined stepped for release of tap.
- (g) If possible, submit thread length, and overall length of tap desired with blue print.

**SPECIAL REAMER!**  
Immediate Delivery

**Immediate Delivery**

**H.S.S. Machine Reamers**  
Decimal, Fractional, Letter,  
and Wire Gauge Sizes  
Prices On Application

**SPECIAL—Right Hand High Speed  
"EXTRA LENGTH DRILLS"  
"AND LEFT HAND DRILLS"  
In Stock for Immediate Delivery**

Get all 3...  
☒ DELIVERY  
☒ QUALITY  
☒ PRICE

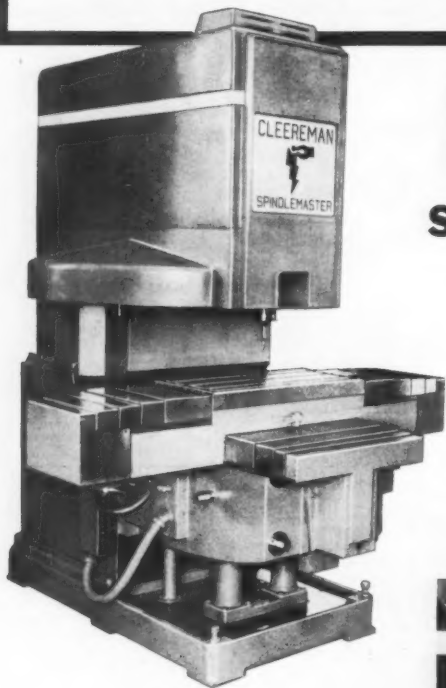
**at FIELD TOOL SUPPLY CO.**

**Industrial Cutting Tools**  
31 S. DESPLAINES ST., CHICAGO 6, ILL.  
All Phones: Financial 6-1195

**The Largest Stock of  
SPECIAL and STANDARD  
TAPS, DIES, PLUG GAGES**

**For more data circle 356 on Postpaid Card**

# TOOL CHANGES IN SECONDS BY NUMERICAL CONTROL



## CLEEREMAN SPINDLEMASTER

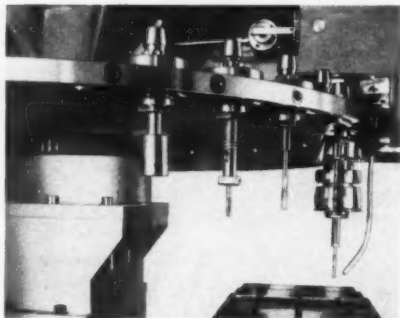
**DRILLS, TAPS, BORES,  
REAMS, MILLS**

**Mechanical Tool Changing Controlled  
Completely by TAPE COMMAND**

- Select any one of 30 tools.
- Position all three axes.
- Control speeds and feeds.
- Activate coolant cycle.
- Control type of operation.

The Cleereman Spindlemaster was designed from the start for Numerical Control and the Control was especially designed for this machine. It is the latest development in versatility in automatic operation on precision work.

Look into this new, cost-cutting opportunity by requesting full details.



**CONTACT YOUR NEARBY CLEEREMAN DISTRIBUTOR OR PHONE, WIRE OR WRITE**

### **CLEEREMAN MACHINE TOOL CORP.**

**GENERAL DISTRIBUTORS: The Jackson-Fotisch Company • 7354 West Lawrence Avenue • Chicago 31, Illinois**  
Factory: Green Bay, Wis.

**For more data circle 357 on Postpaid Card**



**WHATEVER SHAPE YOU NEED IN A PUNCH OR DIE BUTTON,  
*Richard Brothers can supply it***

More than 10,000 sizes and types of standard punches and die buttons are immediately available from Richard Brothers' existing stock.

But that's just the beginning. Richard Brothers will also make any special-shaped punch or die button to your exact specifications . . . will fabricate them from special alloys, if you wish. All R-B punches and die buttons . . . standard and special . . . incorporate standardized R-B features which offer complete interchangeability.

Do business with the leader. Specify R-B punches and related metal-piercing tools. It pays . . . many ways.



**QUALITY**



**RELIABILITY**



**INTERCHANGEABILITY**



**COMPLETE STOCK**

**RICHARD BROTHERS PUNCH DIVISION**

ALLIED PRODUCTS CORPORATION  
DEPT. A8 • 36800 CAPITOL AVENUE • DETROIT 39, MICHIGAN

For more data circle 358 on Postpaid Card

March, 1961

MODERN MACHINE SHOP

57

**Metalworking Trend:** Closer tolerances, finer finishes, and faster production.

**New Machines:** Mattison's horizontal-spindle precision surface grinders . . . with improved finish capabilities, new automatic controls to speed work and control quality, table lengths from 36" to 192".

**How to Save:** Electronically controlled cross-feeds. Automatic wheel reset after dressing. Quiet, smooth, cool hydraulics. Box-type column rigidity. Power assist table positioning. Optional automatic downfeed.

**MATTISON MACHINE WORKS**  
Rockford, Illinois



Greater  
accuracy,  
finer  
finish...  
consistently,  
more  
automatically!



For more data circle 359 on Postpaid Card



For best results  
in Surface Grinding . . .  
Always Use Blanchard Wheels!

The flexibility in application of your Blanchard Surface Grinder enables you to attain peak production at lowest cost on hundreds of different grinding jobs. *But, it is very important that you use the right wheel for each job!*

Blanchard makes and stocks a great variety of silicate, resinoid and vitrified bonded wheels and segments. Ask your Blanchard representative to help you select the wheel — or wheels — best suited to your requirements. Call or write him today. And may we send you a copy of "The Art of Blanchard Surface Grinding" (4th Edition)?

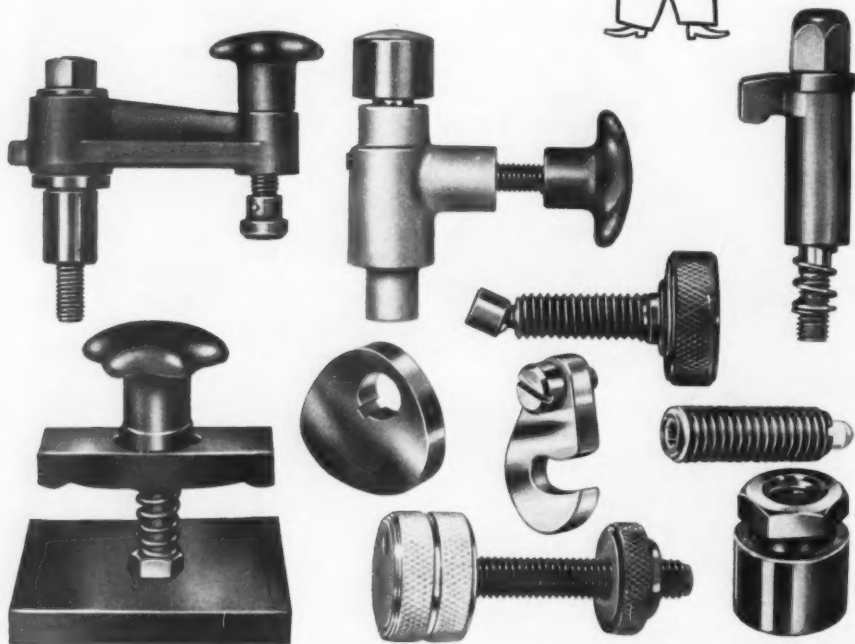
THE BLANCHARD MACHINE COMPANY  
64 State Street,  
Cambridge 39, Mass., U. S. A.



For more data circle 360 on Postpaid Card

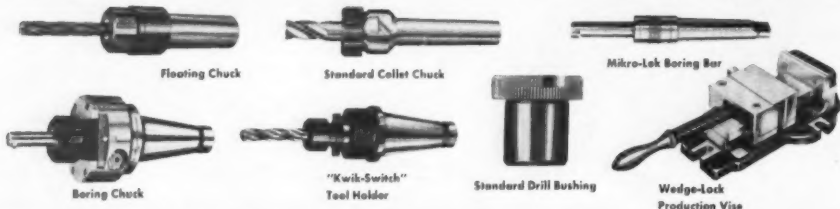
# UNIVERSAL JIG AND FIXTURE COMPONENTS AND CLAMP ASSEMBLIES

Shown here are a few of more than a thousand different items in regular steel and stainless steel—the largest and most complete selection in the United States—now available from Universal Engineering Co. Write today for your copy of the complete, new catalog.



213

OTHER PRECISION-BUILT COST SAVING UNIVERSAL PRODUCTION TOOLS



Floating Chuck

Standard Collet Chuck

Mikro-Lok Boring Bar

Boring Chuck

"Kwik-Switch"  
Tool Holder

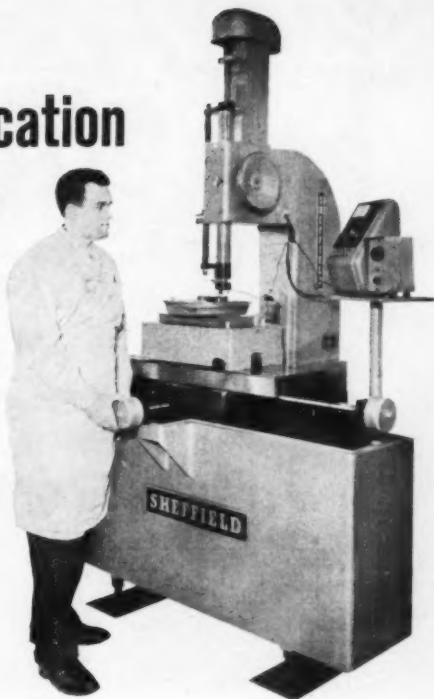
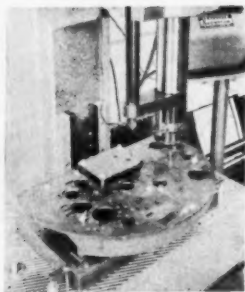
Standard Drill Bushing

Wedge-Lock  
Production Vise

**UNIVERSAL ENGINEERING COMPANY, FRANKENMUTH 9, MICHIGAN**

For more data circle 361 on Postpaid Card

# Difficult hole location problems solved for short runs



At the Westinghouse Ordnance Plant, Lansdowne, Maryland, a Sheffield Coordinate Measuring Machine determines the true location of 18 holes in a magnesium integrator or gear box. Fifteen holes are checked to  $\pm .00017$ ; two holes to  $\pm .00023$ ; and 1 to  $\pm .000075$  (75 millionths).

Inspection with a height gage and setting master previously took two days and did not determine out-of-round condition. The Sheffield gage reduced the time to six hours including set-up and cooling out—and checked for out of roundness as well. Over-

all accuracy of the gage has proved to be within .000075 on both horizontal axes and in the 10" vertical range. Repeatability is within .000010.

100% of the parts which passed inspection on this Coordinate Measuring Machine proved to be perfect in assembly, test, and field use. Short production runs of parts that vary widely in size and hole location, are easily handled.

Write for catalog number P-193 or check with your nearby Sheffield representative on your gaging requirements.

**NEWS:** Before 11:00 a.m. on the first day of the NMTB Exposition in Chicago, September 6, 1960, a Fort Wayne, Indiana manufacturer bought a similar machine being demonstrated in the Sheffield booth. Additional orders continue to come in.

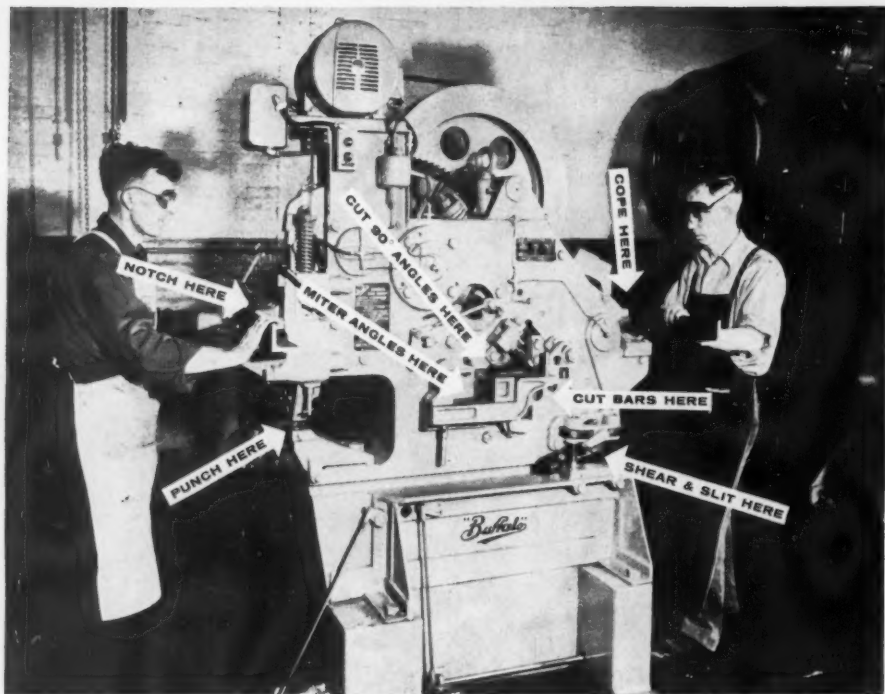
The  
**SHEFFIELD**  
Corporation Dayton 1, Ohio  
A subsidiary of The Bendix Corporation

Gages, Measuring Instruments, Automatic Gaging & Assembly Systems • Machine Tools • Contract Mfg.

For more data circle 362 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 61



# SEVEN OPERATIONS—SAME MACHINE

## SAVES ON MAINTENANCE AND PRODUCTION

A BUFFALO Iron Worker can be the most useful, productive and cost-saving machine in your shop.

Without changing tools, it will do a variety of jobs — **several at the same time.**

It's compact, ruggedly-built, requires practically

no maintenance and is available in your choice of sizes and models.

Worth investigating, a BUFFALO U. I. W. pays its own way and returns dividends. Maybe you can't afford to be without one. Write for Bulletin 322 or . . . better still . . . call in your nearest BUFFALO representative.



### MACHINE TOOL DIVISION BUFFALO FORGE COMPANY

Buffalo, New York  
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.



**'Buffalo' Air Handling Equipment**  
to move, heat, cool, dehumidify and clean air and other gases.



**'Buffalo' Machine Tools** to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.



**'Buffalo' Centrifugal Pumps** to handle most liquids and slurries under a variety of conditions.



**Squier Machinery** to process sugar cane, coffee and rice. Special processing machinery for chemicals.

For more data circle 363 on Postpaid Card

**P-e-e-l-i-n-g  
down  
to**



**a  
perfect  
fit**

Just a twist of a pen knife when your shims are made of LAMINUM® and you have a perfect fit—right on the assembly line. No machining. No grinding. No counting. No stacking. No miking. No costly stand-by equipment.

LAMINUM is the registered trade name for laminated shim stock that looks and acts like solid metal. Plastic or metallic bonded, the laminations p-e-e-l off easily to give you a perfect fit—right to a thousandth—right on the job.

Custom-made to your own blueprint specifications—in any quantity—shims of LAMINUM are produced *exactly for your job*. In brass . . . mild steel . . . stainless . . . aluminum . . . laminations of .002" or .003". You name it! You specify it! You have it!

Find out how LAMINUM can save you time and money on your assemblies. Just write for revised SHIM DESIGN FOLDER No. 4 for complete, up-to-the-minute engineering data.

***LAMINUM***®

**THE LAMINATED SHIM COMPANY, INC.**

West Coast Sales and Service - 600 Sixteenth St., Oakland, Calif.

Home Office and Plant - 3303 Union St., Glenbrook, Conn.

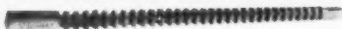
For more data circle 364 on Postpaid Card

**CUT A KEYWAY  
IN 1 MINUTE**  
WITH A  
*Minute Man*<sup>®</sup>  
**KEYWAY BROACH  
KIT**



With one, you can cut a keyway in one minute for as little as one cent by hand with an arbor press. Twenty different kits available from stock for keyways from 1/16" to 1" in any bore from 1/4" to 3".

*Save Time With*  
**STANDARD STOCK  
SQUARE BROACHES**



Starting with a round pilot you can finish an accurate square hole in one pass in less than one minute. Hexagon and round broaches also available.

**The duMont Corp., Greenfield, Mass.**

MAIL FREE BROACH CATALOG AND PRICE LIST S describing Square, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

Name.....

Company.....

Address.....

**duMont**

For more data circle 365 on Postpaid Card

64 MODERN MACHINE SHOP

## Meetings

### Important Meeting

#### Dates

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

**MARCH 5-9** • The American Society of Mechanical Engineers, Gas Turbine Power Conference and Exhibit, Shoreham Hotel, Washington, D. C. Society headquarters: 29 W. 39th St., New York 18, New York.

**MARCH 11-14** • Steel Founder's Society of America, Annual Meeting, Drake Hotel, Chicago. Society headquarters: 606 Terminal Tower, Cleveland 13, Ohio.

**MARCH 13-17** • Industrial Diamond Association Inc., Annual Meeting, Hollywood Beach Hotel, Hollywood, Fla. Association headquarters: 587A Newark-Pompton Turnpike, Box 175, Pompton Plains, New Jersey.

**MARCH 13-17** • National Association of Corrosion Engineers, Annual Convention and Exhibit, Statler-Hilton Hotel, Buffalo. Association headquarters: 1061 M&M Bldg., Houston 2, Texas.

**MARCH 20-24** • American Society for Metals, Western Metal Congress and Exposition, Pan-Pacific Auditorium and Ambassador Hotel, Los Angeles. Society headquarters: Metals Park, Novelty, Ohio.

**MARCH 21-23** • American Power Conference, Sherman Hotel, Chicago. Information: Jack A. Miller, Illinois Institute of Technology, 35 W. 33rd St., Chicago 16, Illinois.

**MARCH 22-24** • Pressed Metal Institute, Spring Technical Meeting, New York City. Institute headquarters: 3673 Lee Rd., Cleveland 20, Ohio.

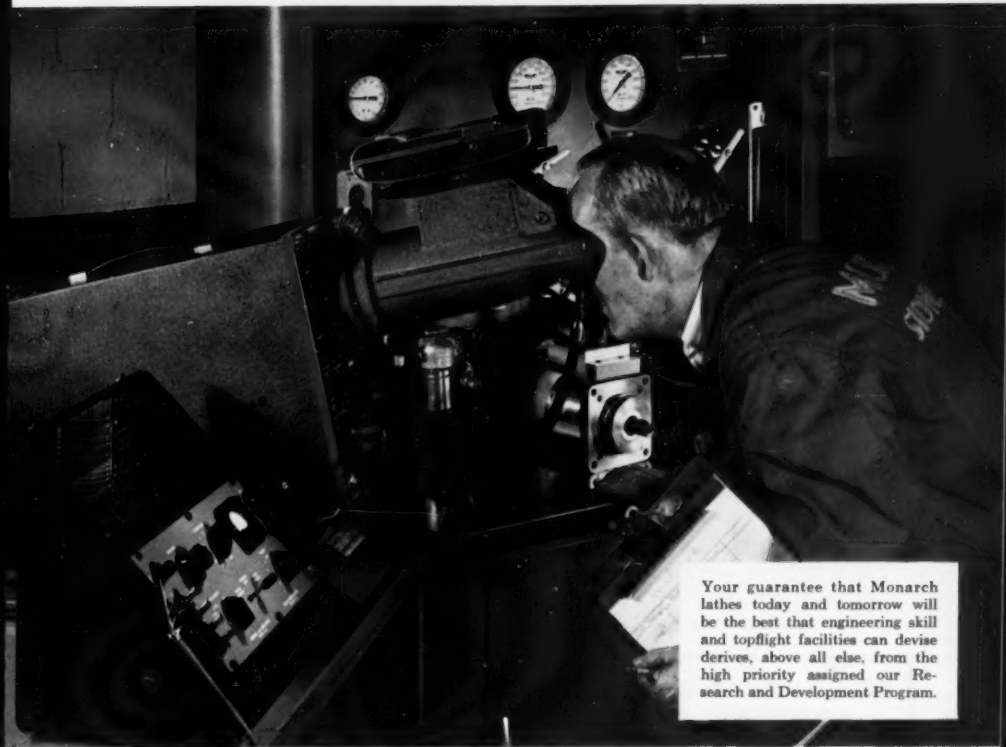
**MARCH 23-25** • American Machine Tool Distributors Association, Spring Meeting, Hotel Mark Hopkins, San Francisco. Association headquarters: 1500 Massachusetts Ave., N.W., Washington, D. C.

**MARCH 27-31** • Instrument Society of America, Symposium on Temperature, Veteran's Memorial Hall and Deshler-Hilton Hotel, Columbus, Ohio. Society headquarters: 313 Sixth Ave., Pittsburgh 22, Pennsylvania.

March, 1961



## He's making a Monarch Lathe...



Your guarantee that Monarch lathes today and tomorrow will be the best that engineering skill and topflight facilities can devise derives, above all else, from the high priority assigned our Research and Development Program.

### *One example of where the extra values come from—in your MONARCH Lathes*

Gauging lathe values is as important to you as gauging lathe quality is to us—same coin, both sides. Spending the fewest dollars on a machine tool is far from getting the biggest dollar's worth, of course.

Witness this hydraulic motor check, one of the thousands of checks and tests conducted each year in our Research and Development Laboratory to meet our unique research, development and quality control objectives. Or should we say "our goals of higher productivity, greater accuracy and optimum dollar value to the user?" Same thing.

It is in the sum total of many procedures like these in both engineering and manufacturing, many exclusive with us, that you find the true value of the Monarch Lathe. And that can be concretely expressed this way: in our *Turning Clinic* today—using your parts—we can demonstrate Monarch lathes that will increase production, reduce or eliminate finishing, lengthen tool life. Isn't performance like that the ultimate bargain? Write: THE MONARCH MACHINE TOOL CO., SIDNEY, OHIO.



WHEN YOU BUY VALUE  
MONARCHS COST LESS



**VISIT MONARCH—We'll turn your part to return you profit**

For more data circle 366 on Postpaid Card

# GREEN PANTOGRAPH ENGRAVERS

*You Make Your Own Engraved Nameplates!*

- ELIMINATE DELAYS!
- KEEP YOUR OPERATING COSTS WHERE THEY SHOULD BE!



## PORTABLE 40-POUND BENCH MODEL 106

Here is a speedy, economical 2 or 3-dimensional engraver used by thousands of dollar-conscious companies. It features 5 positive, accurate pantographic ratios; ball bearing spindle with 3 speeds up to 14,000 rpm. Is supplied with one copy carrier that accepts all standard master type sizes. Will actually work up to 10" by any width. Height of pantograph and position of cutter are continuously adjustable.

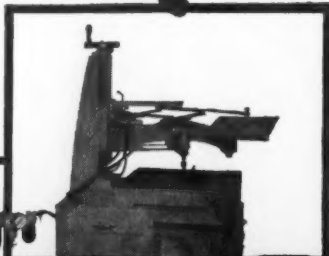
## MODEL D-2 HEAVY-DUTY 2-DIMENSIONAL

Pantograph for milling, drilling and engraving.

Vertical adjustment of copy table automatic with Pantograph. Features: unobstructed on 3 sides to take large work; micrometer adjustment for depth of cut; ball bearing construction throughout; spindle speeds up to 26,000 rpm for engraving or machining; vertical range over 10"; ratios 2 to 1 to infinity — master copy area 26" x 10"



*Write or call for full details and prices.*



## NEW MODEL D2-201 PNEUMATIC ATTACHMENT

for use with Model D2 Pantograph Engraver to rapidly drill holes in printed circuits by tracing templates. Drills as many as 100 holes per minute. Equipped with foot switch, spindle air cylinder, regulating valve and pressure gauge; filter and oiler. It's ready to use as soon as it's attached to an air compressor.

## GREEN INSTRUMENT COMPANY, INC.

Dept. 92, 295 Vassar St., Cambridge 39, Mass. Tel. ELiot 4-2989

For more data circle 367 on Postpaid Card

For fast, economical cutting of flat metal shapes there are  
**7 MODELS OF Campbell Nibbling Machines**

...with cutting capacities ranging from 3/32" mild steel for **MODEL 0** machine to 1 1/2" mild steel for **MODEL 530**, in sheet sizes from 16" or less, to 72".

**CAMPBELL NIBBLERS** are making tremendous savings in time and money for hundreds of users in aircraft and other metal-working plants.

...in fast cutting of ferrous and non-ferrous sheet metals or composition sheets.

...for moderate production runs or experimental development work.



Economical  
"throw-away"  
punch and die



Send for this catalog for complete information on this versatile production and experimental tool

• **CAMPBELL NIBBLERS** cut from 40 to 60 times faster than drilling or filing. A fast-moving punch (350 to 900 strokes per minute) operating over a die, nibbles out the design, taking a small "bite" with each stroke of the punch.

...for any and all kinds of shapes

...for either inside or outside cuts

...with no distortion of material—no internal strains  
—no invisible fractures—no burr

...with a "nibbled" edge that is sufficiently smooth to require very little finishing and sometimes none

**CAMPBELL** standard punches are made double end to double work life and halve the cost. Prices are so low (starting at 40c each, or 20c per working end) that new punches cost less than regrinding dull ones.

Here is a quick picture of **CAMPBELL NIBBLING MACHINE** Capacities

Campbell Nibbler Model #	Sheet Width	WORKING CAPACITY		Strokes per Minute
		Sheet Thickness Mild Steel	Alloy Steel	
0.....	16"	3/32"	1/16"	900
1A.....	20"	3/16"	1/8"	375-650
430.....	60"	3/8"	1/4"	350-525
436.....	72"	3/8"	1/4"	350-525
530.....	60"	1/2"	5/16"	350-525
2524.....	48"	1/4"	3/16"	375-650
2536.....	72"	1/4"	3/16"	375-650

## CAMPBELL NIBBLERS

Wilson Mechanical Instrument Division  
**AMERICAN CHAIN & CABLE**

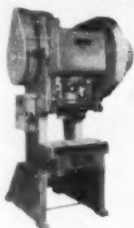
Dept. 931, 230 Park Avenue, New York 17, N. Y.

For more data circle 368 on Postpaid Card

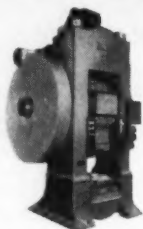
**ACCO**



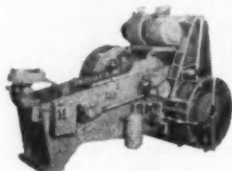
More people  
buy  
BLISS presses than  
any other make



Inclined Presses  
single crank and double crank



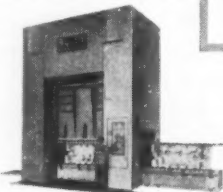
Knuckle Joint Presses



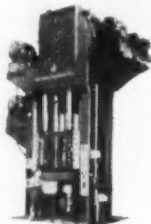
Extrusion Presses



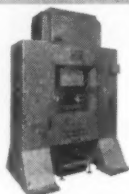
Eccentric Presses



Rolling Bolster Presses



Hydro-Dynamic Presses



High Production Presses



Toggle Drawing Presses

*BLISS is more than a name—it's a guarantee*

**BLISS**  
SINCE 1857

**E. W. BLISS COMPANY**  
Hastings, Michigan

Foreign Subsidiaries: E. W. Bliss (Canada) Ltd., E. W. Bliss (England) Ltd.  
E. W. Bliss Co. (Paris) France, E. W. Bliss-Henschel G.M.B.H., Düsseldorf, West Germany

PRESSES • ROLLING MILLS • ROLLS • DIE SETS • CONTAINER MACHINERY • CONTRACT MFG. • PUBLIC SAFETY

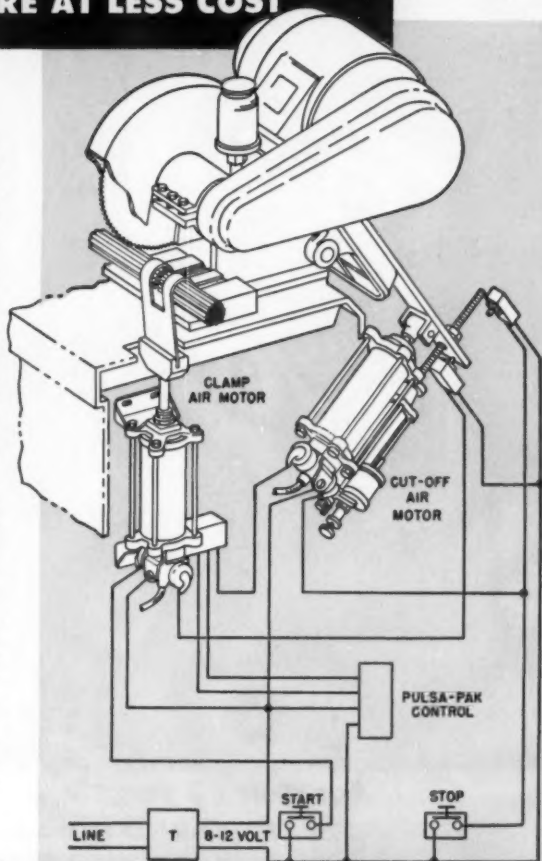
For more data circle 369 on Postpaid Card

## HOW TO MAKE A CUT-OFF SAW PRODUCE MORE AT LESS COST

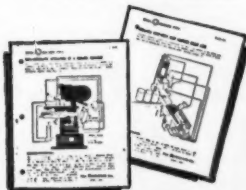
Shown at the right is a SPOT-A-MATION IDEA used in many plants. Almost invariably it has meant cost savings of 50% or more—has improved product quality, lengthened saw life, lessened worker fatigue.

Two Bellows Air Motors are used. One, hydraulically controlled, feeds the saw through the work. The second clamps the work in position. The two Air Motors are electrically interlocked. The cut-off saw can be made completely automatic by adding a third Air Motor to feed the material.

This is another typical way Bellows Air Motors are used to "Spot Modernize" existing equipment. Almost any hand fed, or hand-controlled machine can be made to produce more, at less cost, with versatile Bellows "Controlled-Air-Power" Devices.



**THIS SPOT-A-MATION  
IDEA FILE IS  
YOURS ON REQUEST**



Contains drawings, circuit diagrams, equipment list, and full details to enable you to convert existing equipment to lower cost operation. Write for it today. No obligation. Address Dept. MMS-361, Bellows-Valvair, Akron 9, Ohio.

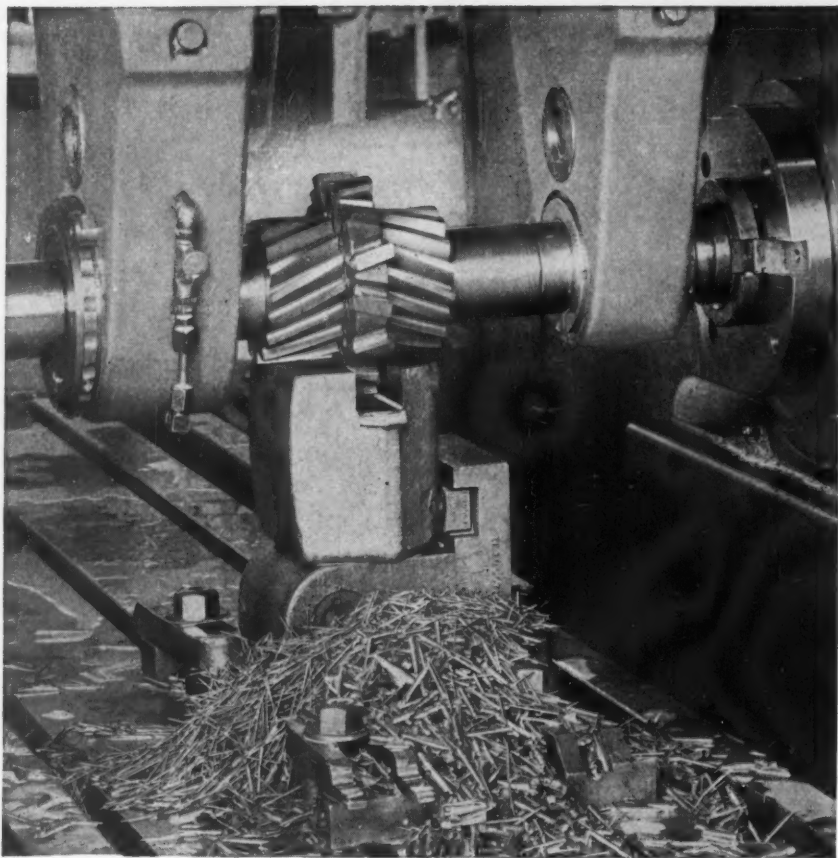
12858-3

# Bellows-Valvair

AKRON 9, OHIO

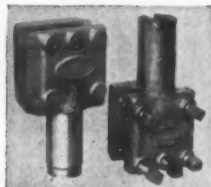
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

For more data circle 370 on Postpaid Card



**For over 20 years**

**BULLARD machine tool posts have been slot-and-slab milled with OK milling cutters**



*Bullard machine tool posts of 1045 SAE steel, forged, normalized, and annealed are slotted and faced on top and two sides in the excellent time of 10 minutes per cut*

Bullard tool posts are standardized for both their vertical turret lathes and boring mills. Batches of 25 and 50 are constantly in the process of manufacture for replacements and new machine sales.

Each tool post is a 41 lb forging of SAE 1045 steel, normalized and annealed. Heads are slotted and faced on three sides in a single pass on a 50 HP Cincinnati Hypowermatic milling machine with a 6" OK inserted blade high speed steel alternate angle milling cutter flanked by two OK solid high speed steel helical mills. Depth of slot, 1-3/8"; Depth of slab cut, 1/4". Speed, 42 rpm; Feed, 2-3/4" pm. Total width of cut, 4-11/16". The inserted blade cutter removes 26.4 cubic inches of metal per pass while the flanking solid cutters remove 18.6 cubic inches.

OK Tool Engineers can help you with production data gained from hundreds of case histories. Put your problem up to them.

THE OK TOOL COMPANY, INC., Milford, New Hampshire



For more data circle 371 on Postpaid Card





## *Slash Threading Costs*

### with **H&G** style DMS Stationary Die Heads and Throw-away *Insert Chasers*

**On your turret lathes and hand screw machines, get big savings in dollars and time with H & G Stationary Die Heads because:**

**1. Economy!** You can buy 3 to 5 sets of H & G Insert Chasers for the price of 1 ordinary set. You can let used H & G Chasers accumulate, with less investment, to be ground more economically at one setting. Or, you might find it less expensive to throw dull Chasers away.

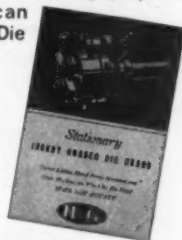
**2. Rejects reduced!** The H & G Insert Chaser is held rigidly in the Chaser Carrier. The Carrier, being larger in area than ordinary chasers, affords greater Chaser "guiding power" for reducing chatter, taper and poor starts.

**3. Thread close to shoulders!** H & G Chasers extend beyond the Die Head face, making extension chasers unnecessary.

**4. One Die Head gives big threading range!** The Style DMS 102 (4 chaser) or Style DMS 152 (5 chaser) Die Heads, for instance, cuts from No. 5 to 1 1/4" Dia. with only 4 ranges of Carriers. Other sizes available for smaller or larger ranges.

**5. Quick change!** H & G Carriers, complete with Insert Chasers, can be changed with the Die Head in the machine.

Why not write for Bulletin No. 12D on H & G Style DMS Stationary Die Heads today?



### **EASTERN MACHINE SCREW CORPORATION**

65 Barclay Street • New Haven 6, Connecticut

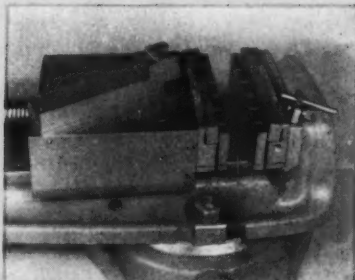
For more data circle 372 on Postpaid Card



You get day - in  
with J & S

## **1. VISE JAWS— ADJUSTABLE & DOWN-HOLDING**

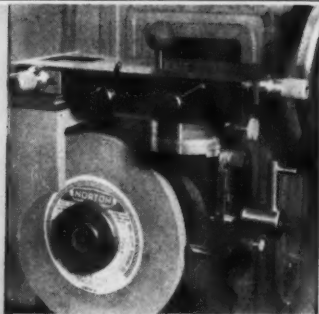
Sturdy, effective vise jaws which are interchangeable. May be used with most conventional milling vises. For more data circle 373 on Postpaid Card



## **7. "FLUIDMOTION" WHEEL GUARD DRESSER**

meets modern grinding equipment demands. Spring loaded pin in the feed mechanism permits the dresser to be easily removed after the dressing operation.

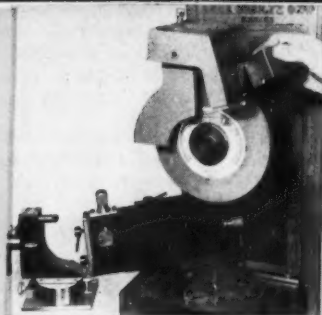
For more data circle 374 on Postpaid Card



## **8. STRAIGHT DIAMOND DRESSER AND CORNER CHAMFERING UNIT**

A new unit interchangeable on J & S Wheel Guard, will dress the periphery of the wheel. More positive, rapid operation with minimum equipment.

For more data circle 375 on Postpaid Card



# day - out economy precision - crafted products

## **ADJUSTABLE DOWN-HOLDING VISE JAWS**

These unique down-holding vise jaws are interchangeable and are adaptable to conventional milling vises, with the same features as the J & S milling vises.

The special adjustment screw minimizes or cancels the contact of the serrated jaws with the workpiece. Spring-attached parallels (hardened and ground) remain in place, thus keeping the cleaning between parts to a minimum. For vises with jaw depths of 2" or more.

## **New J & S "Fluidmotion" Wheel Guard Dresser**

A unique advance in the grinding field, it is adaptable to quills of 3" to 3 1/2" diameter and includes an inverted base with compound micrometer lead screws for maintaining position of formed grinding wheel in relation to the work. Adaptable to 7" or 8" wheels, it may also be used with Model "F" Fluidmotion Wheel Dresser on 7" wheels. Available for most surface grinders.

## **Straight Diamond Dresser and Corner Chamfering Unit**

Engineered by J & S in conjunction and interchangeable with the Wheel Guard Dresser. Diamond block with the diamond protruding from the corner will dress the periphery of the wheel by means of an adjustment screw which minutely exposes the wheel at a 45° angle through the guide, making it possible to break corners with a single pass. Available as complete set with J & S "Fluidmotion" Wheel Guard Dresser or with the J & S Wheel Guard.

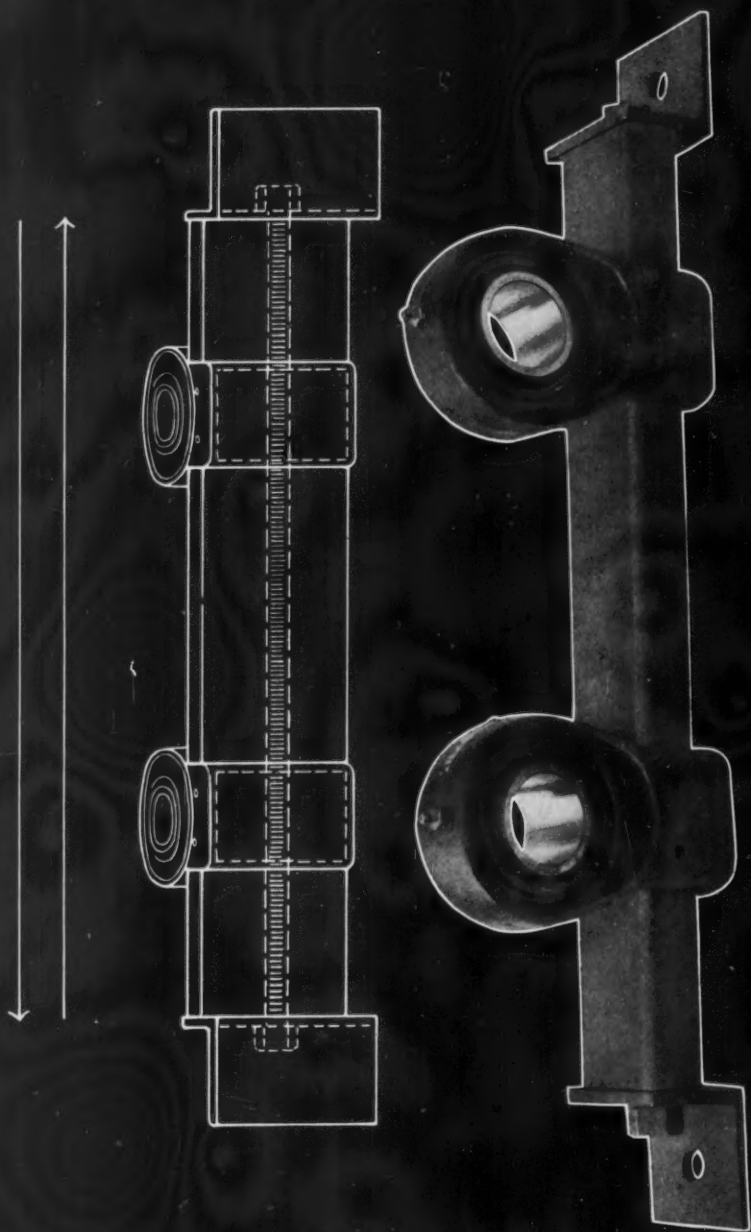
*Literature and data on request*

*Specify product No. listed opposite illustration*

**J & S TOOL CO., INC.**

871 DORSA AVE., LIVINGSTON, N. J.

WYman 2-3181



# A Bearings, Inc. design saved our customer time, trouble and dollars!

Shown is a take-up unit designed by our engineers to perform two jobs simultaneously! The unit's first job is to take up slack in a large belt—Its second job is to keep indexing apparatus in the right spot on the belt.

Previously, the indexing was adjusted separately to a new position every time the belt had to be tightened, no matter how much or how little the adjust-

ment. It was a costly, time-consuming job that kept the equipment out of production for hours.

Now, with this unit, belt take-ups and indexing adjustments are both performed with one turn of the screw on which the two pillow blocks ride.

We solved *this* customer's bearing problem. The answer to *your* problem is as near as your telephone! Call the branch nearest you now!

## BEARINGS, INC.

*Providing bearing service  
in the North*

*and*

*in the South*

**DELAWARE:** Wilmington • **ILLINOIS:** Neiman Bearings Co., E. St. Louis • **INDIANA:** Ft. Wayne • Indianapolis • Muncie  
Terre Haute • **MARYLAND:** Baltimore • **MISSOURI:** Neiman Bearings Co., St. Louis • **NEW JERSEY:** Camden • Newark  
**NEW YORK:** Balanrol Corp., Buffalo • Niagara Falls • **OHIO:** Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton  
Lima • Lockland • Mansfield • Peinesville • Toledo • Youngstown • Zanesville • **PENNSYLVANIA:** Erie • Johnstown • Philadelphia • Pittsburgh • York  
**WEST VIRGINIA:** Charleston • Huntington • Parkersburg • Wheeling

## DIXIE BEARINGS, INC.

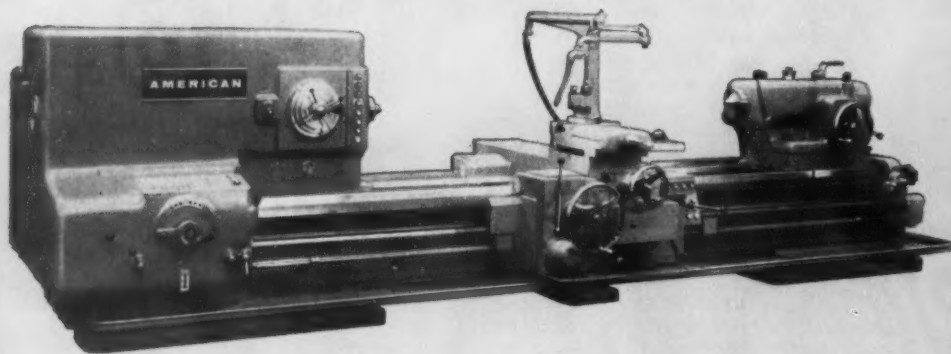
**ARKANSAS:** Little Rock • **FLORIDA:** Jacksonville • **GEORGIA:** Atlanta • **KENTUCKY:** Louisville • **LOUISIANA:** Baton Rouge  
New Orleans • **N. CAROLINA:** Asheville • Charlotte • Greensboro • **S. CAROLINA:** Greenville • **TENNESSEE:** Chattanooga • Kingsport  
Knoxville • Memphis • Nashville • **VIRGINIA:** Norfolk • Richmond • Roanoke

For more data circle 376 on Postpaid Card

## TALK ABOUT ABILITY!

This husky boasts a 100 hp main drive motor and spindle speed range of 6 to 750 rpm. Its massive  $7\frac{1}{2}$ " tailstock spindle offers big load capacity. Pre-selective hydraulic powershift and push button control of cross and longitudinal feeds keep this giant under fingertip control. 48 spindle speeds provide any surface speed with a deviation of less than 6% from that actually required for the chosen diameter. The operator, after setting the correct surface speed, merely dials the work diameter. The computing dials then automatically produce the correct rpm for each diameter. Or . . . the operator may choose rpm directly if he wishes. Write for Bulletin 913-A.

### 100 HORSEPOWER AMERICAN 40" STYLE J-100 PRE-SELECT ENGINE LATHE



This and all other AMERICAN machine tools are available on "Toolease", our own equipment leasing plan.

COMPETE COMPETENTLY WITH

**AMERICAN**

LATHES • RADIAL DRILLS  
SPECIAL MACHINES



**The American Tool Works Company**

Pearl Street at Eggleston Avenue

Cincinnati 2, Ohio

For more data circle 377 on Postpaid Card



# BREAK THE "PROFIT SQUEEZE" WITH BRIGHTBOY

SOFT RUBBER BONDED ABRASIVES

New slants to save your time, cut your costs, improve your product quality

## A NEW APPROACH TO BIGGER TIME SAVINGS

The unique, cost-saving action of multi-use Brightboy (abrasive and rubber, functioning simultaneously) produces a finish that often constitutes the final polish:

**BURRING • CLEANING  
FINISHING • POLISHING**  
*frequently in one operation*

### THE REVOLUTIONARY NEW CONCEPT OF ABRASIVE APPLICATIONS

For working all metals, wood, glass, laminated materials, some plastics.

49 readily available Brightboy STOCK textures are JOB-MATCHED to your machine and manual operations for conventional and automation production. Aluminum Oxide and Silicon Carbide abrasive grains—grades extra fine to extra coarse—in soft, semi-firm, firm and tough rubber binders. *The only complete, comprehensive stock line of soft rubber bonded abrasives.* In wheels, sticks, rods and blocks for machine and manual operations.

BRIGHTBOY INDUSTRIAL DIVISION  
WELDON ROBERTS RUBBER CO.

95 North 13th Street • Newark 7, N. J.

*America's Pioneer Manufacturer  
of Rubber-Bonded Abrasives*



Every shop needs  
this illuminating  
outline of  
NEW AND  
ADDITIONAL  
APPLICATIONS  
FOR  
ABRASIVES



## THE NEW BRIGHTBOY CATALOG

featuring

- ★ Methods and applications
- ★ Machine speeds
- ★ Job-matched grains and textures
- ★ New, revised wheel sizes

WRITE TODAY FOR YOUR COPY

For more data circle 378 on Postpaid Card



New control system provides wheel dressing with infinitely variable continuous cross feed, from 0 to maximum affording proper wheel dressing speed with exact duplication each time.



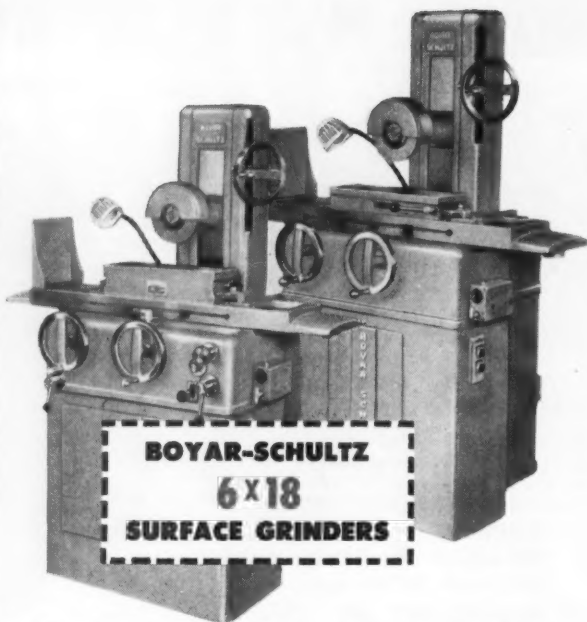
One-shot central lubrication system assures correct amount of oil to all bearing surfaces.



Table ways, one V and one flat are ground and hand scraped. They travel on hardened and ground tool steel ways.



Unique column assembly combines vertical and cross feed travel. Sturdy vertical column has oversize bearing surfaces. Hardened and ground cylindrical ways provide accurate long wearing surface for cross feed travel.



**BOYAR-SCHULTZ**  
**6x18**  
**SURFACE GRINDERS**

## GREATER Precision . . . Production . . . Economy

Built to produce finest tool room accuracy . . . big and sturdy enough for heavy production, the Boyar-Schultz 6-18 Surface Grinder is a truly versatile machine.

Its many exclusive features keep this Grinder 'way out in front. The most recent improvements are the rapid traverse cross feed and a new "one-shot" oiling system.

*Write, Wire or 'phone . . . we'll be glad to show you the superior points of this fine surface grinder.*

*Boyar-Schultz* CORPORATION

2020 SOUTH 25TH AVENUE, BROADVIEW, ILLINOIS

For more data circle 379 on Postpaid Card

# NEW CLAUSING HEAVY-DUTY DRILL PRESSES

WITH  
**POSITIVE-POWER  
VARIABLE**

OR

**5-SPEED DRIVES**

15" and 20" SIZES

**NEW . . . DIAL SPEEDS**  
with **VARIABLE DRILLS**

20-inch . . . . . 150-2000 rpm  
15-inch . . . . . 500-4500 rpm

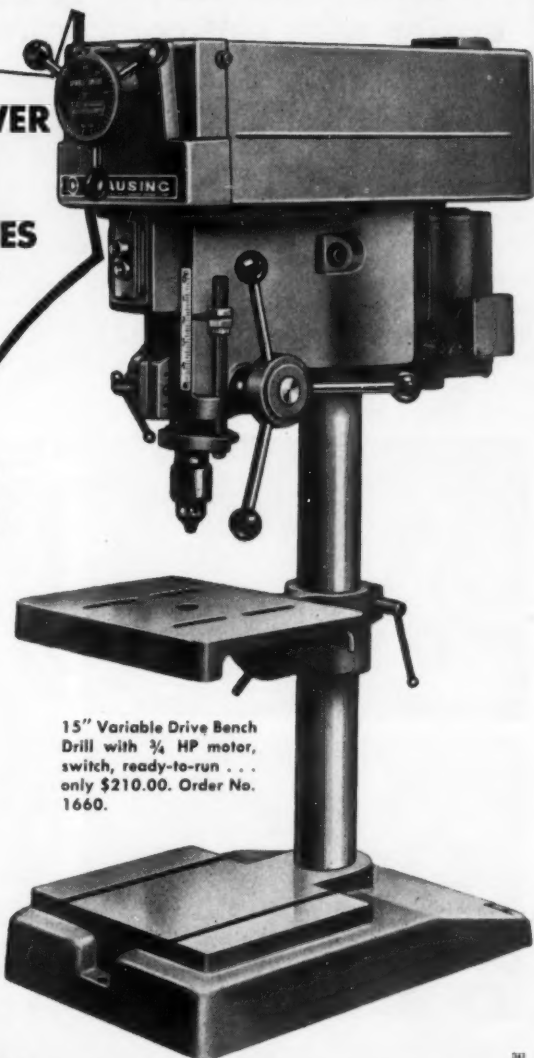
## 5-SPEED DRILLS

20-inch . . . . . 150-2000 rpm  
15-inch . . . . . 410-5380 rpm

- **MACHINED and  
BALANCED PULLEYS**
- **LUBRICATED FOR LIFE  
BEARINGS**
- **GROUND TABLE and BASE**
- **READY-TO-RUN with  
MOTOR & SWITCH  
INSTALLED**

Way ahead in EVERY comparison you could make. See for yourself. Write for literature today.

15" Variable Drive Bench Drill with  $\frac{3}{4}$  HP motor, switch, ready-to-run . . . only \$210.00. Order No. 1660.



**CLAUSING**  
DIVISION OF  
ATLAS PRESS COMPANY

OUTSTANDING VALUES IN PRECISION MACHINES



3-112 N. PITCHER STREET, KALAMAZOO, MICHIGAN

For more data circle 380 on Postpaid Card

## Make work handling safer, faster, easier with self-contained lift magnets

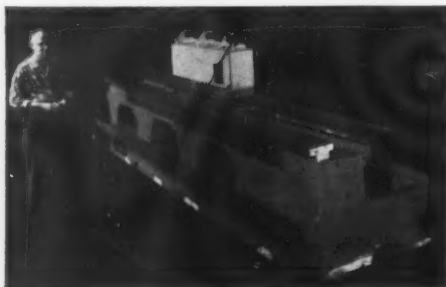
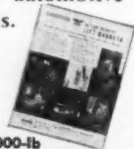
**SIMPLE OPERATION** permits any worker to handle heavy, irregularly shaped workpieces without danger or damage when conventional work-handling equipment is converted to magnetic lifting with Sundstrand "Power-Grip" lift magnets.

**QUICK CONVERSION** of job or overhead cranes from conventional to magnetic lifting because unit is self contained battery operated and does not require external power connections. Remote controls can be provided if desired.

**SELF-CONTAINED POWER** makes lifting power available in plant or out. Receptacle provided for trickle charger that brings battery up to full charge during idle hours. Dial shows charge condition.

**THREE CAPACITIES** available offer 2000, 4000 and 8000 lb. of lift. Power is supplied by conventional automotive type 6 and 12 volt batteries.

*For more information, see your dealer or write for Bulletin A-266.*



◀ Model 80 magnet lifting 8000-lb machine tool bed casting.



▲ Yard handling is simplified with remote operated lift magnets.

◀ Multiple unit using three magnets on beam for lifting sheet stock.

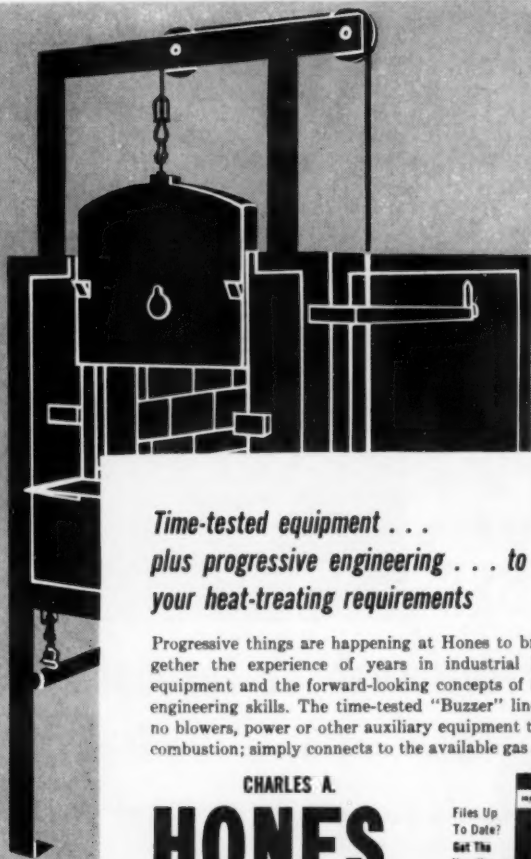


## SUNDSTRAND-AMERICAN BROACH

ANN ARBOR, MICHIGAN

Division of SUNDSTRAND CORPORATION

For more data circle 381 on Postpaid Card



*Time-tested equipment . . .  
plus progressive engineering . . . to meet  
your heat-treating requirements*

Progressive things are happening at Hones to bring together the experience of years in industrial heating equipment and the forward-looking concepts of modern engineering skills. The time-tested "Buzzer" line needs no blowers, power or other auxiliary equipment to effect combustion; simply connects to the available gas supply.

CHARLES A.

**HONES** INC.

141 S. Grand Ave., Baldwin, L.I., N.Y.

Files Up  
To Date?  
Get The  
New Hones  
Catalog



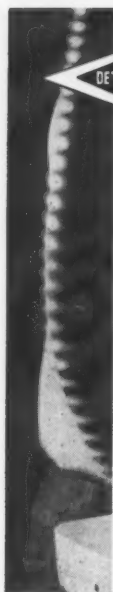
Melting Furnaces

Venturi Air Mixers

Soldering Furnaces

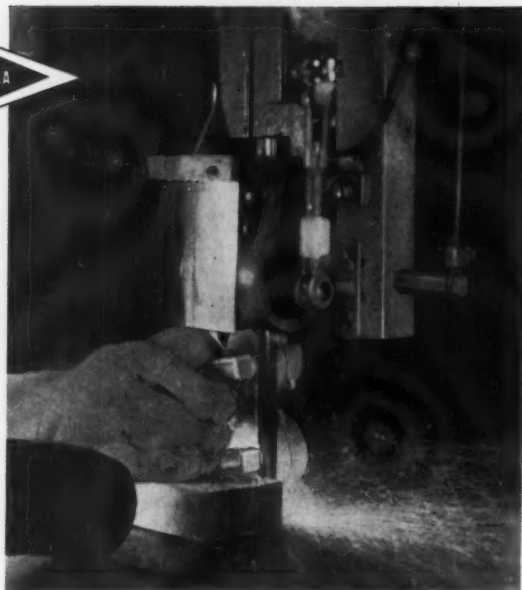
**MANUFACTURERS OF "BUZZER" EQUIPMENT FOR  
HEAT TREATING · MELTING · SOLDERING... SINCE 1911**

For more data circle 382 on Postpaid Card



FRICITION  
CUTTING

**BAND  
SAW  
BLADES**



## LITERALLY FLOW THROUGH FERROUS METALS

***At Blade Speeds of Almost 3 Miles Per Minute!***

Frictional heat softens the metal ahead of the blade, and teeth remove the soft metal chips. Friction sawing is fast, even on the toughest alloys that are very difficult to cut by other methods.

Barnes Friction Cutting Bands are specifically made for this high speed service. Selected steel, specialized heat treatment and the famous Barnes factory-weld with perfectly matched teeth all contribute to the exceptional performance of Barnes Friction Cutting Bands.

Buy from your Barnes Distributor. His stock is maintained to meet your needs and he is always ready to give you prompt and efficient service.

**W. O. BARNES CO., INC.**

1297 TERMINAL AVENUE

DETROIT 14, MICHIGAN

*BARNES-DISTRIBUTOR Teamwork means quality products . . .  
available locally at lowest possible cost.*

**For more data circle 383 on Postpaid Card**





# modern machine shop

## ADVERTISING REPRESENTATIVES

**Granville M. Fillmore, Vice President**, 60 E. 42nd St., New York 17, N. Y., Murray Hill 7-7390. Eastern New York State, Connecticut, Massachusetts, Rhode Island, Vermont, New Hampshire, Maine.

**John M. Krings, Vice President**, Room 211-A, 540 N. Michigan Ave., Chicago 11, Illinois, DElaware 7-5441. Western Michigan, Illinois, Wisconsin, Iowa, Minnesota, the Dakotas, Northern Indiana.

**George E. Hay**, 431 Main St., Cincinnati 2, Ohio, CHerry 1-5924. Western Pennsylvania, Western New York, Ohio, Kentucky, Southern Indiana.

**Jeryl L. Marlatt**, 1051 Brooklawn Rd., Birmingham, Mich., MIDwest 6-5935. Eastern Michigan, Northwestern Ohio.

**Norman S. Rogers**, 431 Main Street, Cincinnati 2, Ohio, CHerry 1-5924. Central Indiana.

**Gene J. Schwarber, Advertising Manager**, 431 Main Street, Cincinnati 2, Ohio, CHerry 1-5924. Missouri, Kansas.

**Duncan W. Barton**, 60 E. 42nd St., New York 17, N. Y., Murray Hill 7-7390. Eastern Pennsylvania, Central New York State, New Jersey, Maryland, Delaware, Washington, D. C., Long Island, Brooklyn.

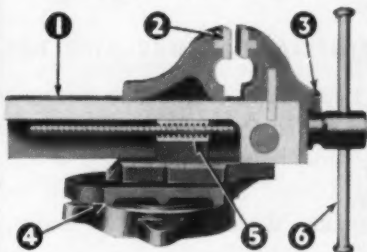
**The Robert W. Walker Company**, 730 South Western Ave., Los Angeles 5, Calif., DUnkirk 7-4388, 57 Post St., San Francisco 4, Calif., SUTter 1-5568. California, Oregon, Washington.

★ ★ ★ ★

**Circulation over 56,000—  
largest in metalworking field**

## VICE FEATURES

1. exclusive steel slide milled from solid bar
2. replaceable jaw inserts held by top-entering pins
3. outside screw retainer



4. positive locking 360° swivel base
5. longest wearing alloy steel nut
6. one-piece non-pinched handle

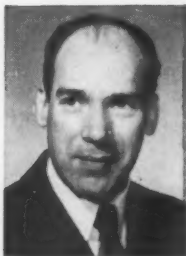
## SOLID STEEL SLIDE

Simplex industrial vises give you the advantage of solid steel slides, jaws, nuts for maximum strength and ruggedness long after their modest cost is written off. Line includes milling machine, pipe, sheet metal and other models.

## Desmond Simplex

**The Desmond-Stephan Mfg. Co.**  
Urbana, Ohio

For more data circle 384 on Postpaid Card



Fred W. Vogel

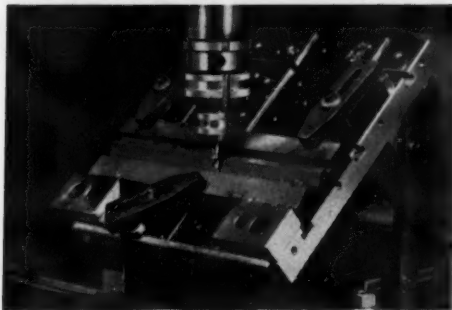
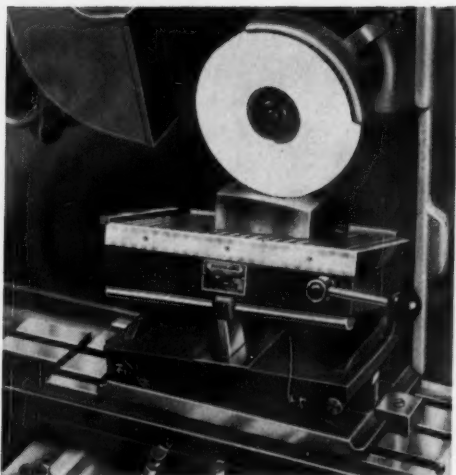
## Over the Editor's Desk

### DEPRECIATION HERE AND ABROAD

In the most recent issue of *Capital Goods Review* published by Machinery and Allied Products Institute is the result of the latest research study in the field of depreciation policy. In a comparison of depreciation allowances in the United States with seven other industrial countries—Great Britain, Canada, West Germany, Sweden, France, Italy, and Japan—the findings with respect to productive equipment reveal the following: In Great Britain and Japan, the first-year write-off exceeds 50 percent of cost. In Sweden and Italy it exceeds 30 percent. The corresponding figure for the United States is 13 percent.

Great Britain and Sweden permit a recovery of more than 70 percent of cost in the first three years of service, and Japan and Italy allow over 60 percent. The American equivalent is 35 percent. Only West Germany appears to be in our class. In 1953, the United States had the worst tax depreciation system of any major industrial country in the world. The Internal Revenue Code of 1954, which authorized the use of either the double-rate declining-balance or sum-of-the-digits depreciation on thereafter-acquired assets, went far to correct this situation. For the moment we were more or less abreast of the procession. Since then, however, we have stayed put, while other countries have moved on. It is obvious that once again we are near the tail end.

Fundamentally, the stimulus from liberalized depreciation is twofold. One, it augments the supply of capital funds and two, it increases the incentive to invest such funds. This latest research study concludes with the comment that we cannot afford, in the least, to lose the potent stimulus to capital accumulation and to investment resulting from larger depreciation deductions.



# Robbins Angular Tooling Saves Time...

**IN GRINDING** Single or compound angles set up in seconds with this Robbins Magna-Sine. Available in a range of sizes, Magna-Sines double as "everyday" magnetic chucks for all surface grinding jobs, or can be used off the machines for bench work.

**IN MACHINING** Heavy-duty 12" x 12" or 24" x 24" Sine Plates permit safe, accurate angular machining without V-blocks or angle plates. Non-magnetic top plate has tapped holes and T-slots. Special construction resists stress of boring and milling.

**IN INSPECTION** Four quick steps to easy setups: 1. Check Table of Constants for standard gage block needed for proper angle. 2. Select gage block. 3. Insert gage block and lock top plate. 4. Position work. Versatile 4" x 4" model shown here is also available as magnetic Magna-Sine.

Robbins Angular Tooling features hardened and ground alloy-steel work and bearing surfaces, distortion-free ribbed bases, positive locking, and, in Magna-Sine models, the most powerful ceramic permanent magnet ever built.

See your Robbins Representative, or write for prices and specifications of the complete line.

61-12

**EX-CELL-O FOR PRECISION**

PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD PIDS AND INSPECTION • SMALL JOG DRIVERS • JIG AND FIXTURE COMPANIES • TORQUE ACTUATORS • CONTOUR PROJECTORS  
GAGES AND GAGING EQUIPMENT • HANDED SURFACE PLATES • COMPUTER PROGRAMS • AIRCRAFT AND SPACE  
LANDER PRODUCTION PARTS • ATOMIC ENERGY EQUIPMENT • MARY AND OTHER PACKAGING COMPANIES

**EX-CELL-O**  
CORPORATION

Bloomington Plant, 845 E. Sater St., Bloomington, Ohio

For more data circle 385 on Postpaid Card

## Over the Editor's Desk . . .

### FIRST THINGS FIRST

By neglecting a basic element in cutting tool preparation, the metal-working industry is literally wasting hundreds of machining man-hours, in spite of the terrific advances in automation. In essence, that is what Robert M. Miller of DeVlieg Machine Co. recently told a group of tool and manufacturing engineers.

The basic function of any machine designed for metal removal, he reminded the engineers, is to make a chip. The machine does not make a part, but rather makes a chip and leaves a part. Thus, for efficiency, the machine depends on the chip-making member, the cutting tool—and the efficiency of the cutting tool on proper grinding.

But, he added, the importance of grinding cutting tools properly apparently is still not very well understood by industry today. Cutting tool grinding is still too often relegated to the attic, so to speak, and its prime role in contributing to machine tool efficiency is completely disregarded.

With the development of automated machines some years ago, and with the advent of numerically-controlled machine tools, Mr. Miller pointed out, it is becoming absolutely essential that more attention be paid to cutting tools and their preparation—to keep machine tool spindles in action longer. The complexity of today's automated and numerically-controlled machines is such that their cost can, and very often does, run into six figures. To justify such expenditures, spindles must be kept running a greater percentage of the available time.

★ ★ ★ modern machine shop ★ ★ ★

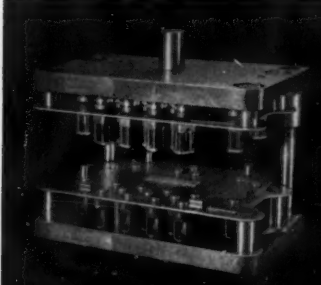
### ONCE AGAIN

Once again an opportunity is afforded those who desire to see a large quantity of new developments first hand. The opportunity to which we refer is the 12th Western Metal Congress and Exposition, to be held on March 20-24 in Los Angeles at the Ambassador Hotel and the Pan-Pacific Auditorium and Pavilion.

In addition to the many technical-scientific informative papers and discussions, more than 200 displays, manned by technical engineers of established repute, will emphasize current progress in metals application and employment.

For a more comprehensive report covering this important event of the month, turn to Page 132.

# *faster changeovers boost press production*




## WHISTLER MAGNA- DIES

Proved to thousands.

**WHISTLER  
MAGNETIC PERFORATING DIES  
IN ACTION**

**PRESS DOWN TIME FOR SET UP  
(3) OPERATIONS  
LESS THAN 12 MINUTES**



Whistler Magnetic Perforating Dies feature interchangeable parts fastened to steel templates which are patterned to the stamping. Punches and dies are assembled and disassembled in templates on an assembly bench while the presses are working on other production.

- **REDUCE DIE COSTS:** In one plant, over 1500 operations (for parts up to 3' x 5') have been tooled up at an average cost of \$200 each.
- **EXTEND PUNCH AND DIE LIFE**
- **SAVE STORAGE SPACE**
- **ELIMINATE DELIVERY DELAYS:** Punches and dies stocked in .001" increments from .100" to .500" diameters. Other sizes carried in stock up to 3".

GET THE TIME AND MONEY SAVING STORY ON WHISTLER PRODUCTS:  
magnetic dies • adjustable dies • custom dies

S. B. WHISTLER & SONS, INC.  
740 Military Road, Buffalo 23, N. Y.

mail the following: ☐ Magna-Die Catalog  
☐ Adjustable Die Catalog  
☐ Custom Die Bulletin

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

For more data circle 386 on Postpaid Card



## **Report from Washington**

### **on Events Which May Affect You and Your Job**

• **SOME CAUTIOUS OPTIMISM ABOUT THE BUSINESS OUTLOOK** is cropping up in Washington these days. President Kennedy's economists see the trend as still downward—but they now think they can see when bottom will be reached. They wouldn't be surprised if it occurred this Spring—by May or even April. This encouraging prospect may be surprising, in the light of recent news on housing, incomes, autos, etc. But the experts say we're probably moving through the worst of the downturn. The economists now believe they can spot favorable factors. The consumer will help quicken the pace of business. He has been saving at a high rate, but is beginning to need goods. When he does start buying, dealers will have to rebuild stocks. The federal government will provide additional lift. Spending for defense, highways, public works, etc., will be increased soon. Expanded unemployment compensation is coming, too. Here's the trend of business that the experts now foresee: In the first quarter, business will continue to ease further. In the second quarter, the trend will level out. Business will begin to feel the effects of larger U.S. expenditures. In the third quarter, consumer spending will bring an end to inventory-cutting and federal outlays will keep rising. In the fourth quarter, business will pick up a bit more speed. Even then, it won't be really rolling . . . just gaining some. Officials fear it will take two years to get things roaring.

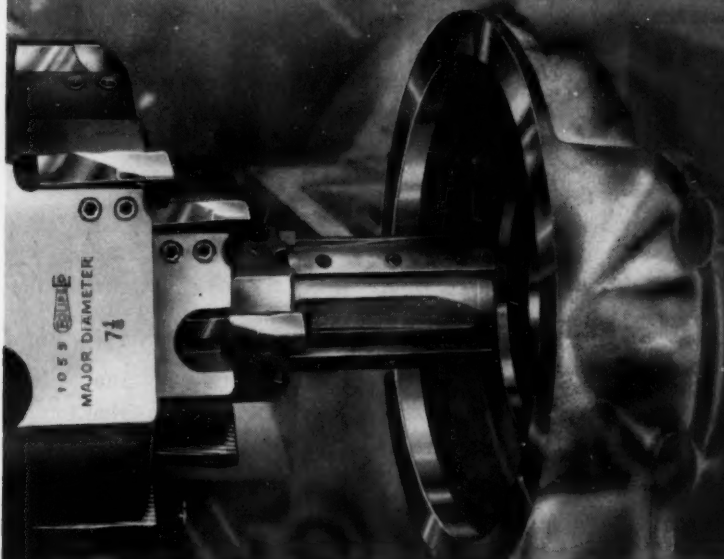
• **YOUR COSTS WILL RISE AGAIN THIS YEAR**—wages, taxes, and materials. That's the conclusion we get from analysts in both government and industry. Unfortunately, the rise in sales volume that is expected later in the year won't be great enough to lower unit costs. A squeeze on profits will be the result. Businessmen won't be able to pass cost hikes along in 1961. There are two reasons: Competition will be keener and buyers are price-conscious. The outlook for price increases is for a gain of about 1%



# Eclipse

## INSERTED BLADE CUTTING TOOLS

DESIGNED FOR YOUR TOUGHEST  
PRECISION CUTTING JOBS



**MATERIAL:** Grey cast iron.

**JOB:** Bores three diameters; faces two surfaces; cuts one chamfer.

**TOOL:** Eclipse multi-operation carbide tipped inserted blade cutter equipped with a replaceable bronze wear stripped pilot.

**RESULT:** Finer finish, accurate size and absolute concentricity.



**WRITE FOR CATALOG C-59**

**ECLIPSE COUNTERBORE COMPANY**

1600 BONNER AVE. DETROIT 20, MICHIGAN

For more data circle 387 on Postpaid Card

## Report from Washington . . .

in wholesale prices and  $1\frac{1}{2}\%$  to  $2\%$  in consumer prices. Industrial goods will firm in the second quarter. Metals will go up first and machinery, lumber, and other building materials later on. Service costs will account for the increase in consumer prices. Here's the story on wages, industry's largest single cost: Wage negotiations will yield an average increase of 9¢ an hour—8¢ or so in manufacturing, 11¢ in nonmanufacturing. Escalator clauses in many contracts will bring automatic hikes for part of this—3¢ to 4¢—for 2.8 million workers. Fringe benefits will add still further to labor costs. This is what you can expect on taxes as the year moves along: At the state-local level, new income taxes and sales and gas levies will noticeably increase the costs of doing business. At the federal government level, business can expect higher payroll taxes to finance a big unemployment insurance program. Social security taxes may go up, too, if President Kennedy's program for medical care for the aged is adopted.

- **THIS MAY BE AS GOOD A TIME TO BORROW** as any that's likely in 1961. That's the view of a growing number of monetary specialists. They look for very little, if any, further decline in rates of interest. An early end to the recession is the leading reason for this. In other words, the demand for loans will begin to increase soon. Most experts in Washington believe that the Federal Reserve Board won't let interest rates on borrowed money ease much further.

- **THE PRODUCTIVITY OF AMERICAN INDUSTRY ISN'T EXPANDING** as fast as it has in past years. During 1960, the output per man-hour for all manufacturing workers went up only  $2.7\%$ , compared with a  $6.8\%$  gain in the prior year. What is worse, the index halted its rise last Winter; it is down about  $1\%$  from the 1960 high. And this measurement of output may fall more before rising again. Since the year 1957, output per man-hour of all types of manufacturing employees went up  $11.4\%$ . Over that same period of time government experts say that wages and fringes rose  $13\%$ .

- **LABOR NEGOTIATIONS WILL BE FAIRLY ROUGH THIS YEAR.** All signs point to a tough attitude by management and a refusal to give ground on sweeping union demands. Labor leaders realize that rising unemployment will reduce their bargaining power but they expect some help from the new Administration. The unions will center their demands on retention



**WHICH  
BORE-SIZING  
PROBLEM  
IS  
YOURS?**

A Sunnen Honing Machine will handle any hole-sizing job shown here. It's the most versatile machine for all types of I.D. work ... now used in thousands of shops.

It corrects all previous machining errors with minimum stock removal ... and guarantees tolerances to .0001" with any desired surface finish.

You pay no premium for the extra precision ... because Sunnen Honing is a fast, economical abrasive stock removal process.

It handles tandem bores, thin wall parts, blind holes, bores with ports or lands—in any size or shape part. No fixtures, no chucking or set up time.

I.D. range: .100"—2.625" with standard tooling. Built to order thru 4 1/2".



For more data circle 388 on Reader Card

**SOLVE ALL OF THEM WITH ...**

**SUNNEN  
HONING**

SUNNEN PRODUCTS COMPANY

7924 Manchester Ave. • St. Louis 17, Mo.  
Canadian Factory: Chatham, Ontario

**ASK FOR FREE BOOKLET**

X-SP-5075 ... showing  
99 honing case  
histories covering  
all types of  
bore-sizing problems.

7279A

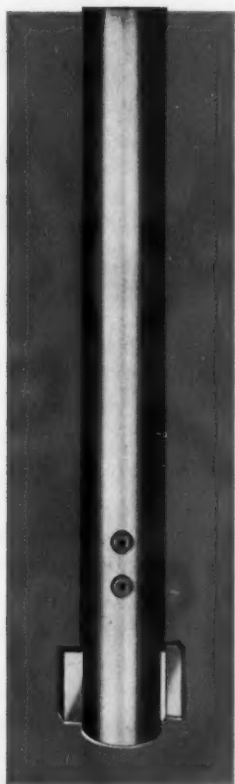


## Report from Washington . . .

of escalator clauses, on expansion of severance pay and no efforts to establish shorter work-weeks. On wage rates, as already noted, settlements will average around 9¢ an hour. The settlement of the tug-boat dispute in New York in January set a pattern: It showed that the Kennedy Administration won't stand by while major strikes cripple the economy. Secretary of Labor Goldberg moved in quickly and worked out a formula to get the trains running again. In the future, he may move to intervene—before strikes reach the disaster state—using the President's influence and prestige to shorten or avert walkouts.

• **SOME IMPORTANT TAX CHANGES ARE LIKELY THIS YEAR.** The new President's advisers, including Treasury Secretary Dillon, have already singled out some objectives for action at this session of Congress. Their aim is to get a set of recommendations to Congress by April 1, in time for action before Congress adjourns. They aren't talking about a temporary tax reduction which may come if business gets worse. They want to plug loopholes and spur investment. Here's what Kennedy's advisors probably will recommend: Repeal of the dividend credit—a Democratic campaign promise. Withholding taxes on dividends by the paying firm. This is aimed at collecting large sums now said to be escaping taxes. Withholding taxes on interest payments isn't being considered now. The large number of small interest-payers is a problem. Tightening up on expense accounts to end what Kennedy people term abuses—indirect benefits in lieu of salary increases. Liberalizing depreciation allowances, to encourage business investment in new equipment. One idea is to exempt from taxes outlays in excess of depreciation being taken. Also under study is allowing depreciation at replacement value. Congress probably will buy the bulk of this package. Kennedy will sell it as a first step in a long-range program designed to reform the Tax Code and thereby bring about reductions in tax rates for individuals.

• **YOU'LL HAVE TO PAY HIGHER SALARIES TO COLLEGE GRADUATES** this year. Competition for hiring of June graduates is already more intense than in any other period. Technological advances are generating needs for skills faster than the colleges can turn out trained persons. Starting salaries generally will top 1960's by \$15 to \$20 a month. Engineers and scientists will get \$535 to \$550 a month. Others will be hired at \$420 to around \$470 a month.



## WITH MADISON YOU GET A 100% DIVIDEND IN STOCK REMOVAL

You now get double the amount of stock removal for the same dollar investment when you use Madison's new DOUBLIFE® Reamer.

- Unique switch-over plate allows you to extend the cutting edges for hours of extra life.
- Cutter adjustable in bar — cutter need not be removed from bar to make size adjustments. Diameter can be changed in seconds by simply turning adjusting screw.
- "Scissoring" eliminated — mating parts slide on a precision ground "V" and flat.
- Speed and Ease in Regrinding — You grind only two edges, then set accurately to size desired.
- Tolerances can be held to .0005" and the finish produced is from 50 to 100 R.M.S. depending on feed, speed and material.
- No floating holders are required — cutter has floating action in bar.

Get further information from your Madison representative or write for latest bulletin.



# MADISON Industries, Inc.

P. O. BOX 1137, PROVIDENCE, RHODE ISLAND

For more data circle 389 on Postpaid Card



# As I See Your Supervisory Problems

By ALFRED M. COOPER

Consulting Editor, Modern Machine Shop  
and author of "How to Supervise People"

**There can be no doubt that most Americans**, and certainly industrial management, view the forthcoming decade of '60-'70 with a degree of misgiving. There is justification for this feeling, if for no other reason than because the entire world appears to be in a constant state of turmoil and rapid fire change.

The more one studies this situation the clearer it becomes that the future of this country depends to a great extent than ever before upon positive action taken by those key men, the members of industry's supervisory force. The reasoning here is clear: it is no exaggeration to state that the future of our world depends upon the thought, beliefs, and actions of America's industrial workers, both men and women. And what the worker feels and thinks depends more upon the action of his immediate supervisor than on any other single factor.

The decisions of management are important to the worker, principally as these are reflected in the supervisor's day-to-day relationship with those reporting to him. Long ago the intelligent worker learned to take inspired statements of political leaders with several grains of salt. But so long as the supervisor retains his rightful authority the thinking of these on-the-job artisans quite accurately reflects the type of supervision they receive.

It is true that, since 1945, the American worker has become more and more dissatisfied with what he has learned about the steadily deteriorating position of his country as a world power. Yet, in the aggregate, these millions of men and women have more practical common sense than any other group of workers in the world. And they have long ago given up hope of

*For answers to your perplexing managerial problems address your letters to Mr. Alfred M. Cooper, MODERN MACHINE SHOP, 431 Main St., Cincinnati 2, Ohio.*



# Here's why AIRETOOL pneumatic tools help boost production...

- 1 POWER** Rugged, efficient air motors produce power to spare.
- 2 VERSATILITY** Their job-fitted flexibility performs under all conditions with speed and accuracy . . . at close quarters or with complete tool interchangeability.
- 3 EASY TO HANDLE** They're lightweight to cut operator fatigue . . . and increase output.
- 4 EASY MAINTENANCE** Airetool's simple design and solid engineering eases maintenance costs . . . cuts downtime to a minimum.

If you're looking for ways to cut maintenance and increase production . . . take a look at Airetool. Write today for our new full line Bulletin 70.



More than 30 years'  
experience in pneumatic tools

**BRANCH OFFICES:** New York, Chicago, Tulsa, Philadelphia, Houston, Baton Rouge

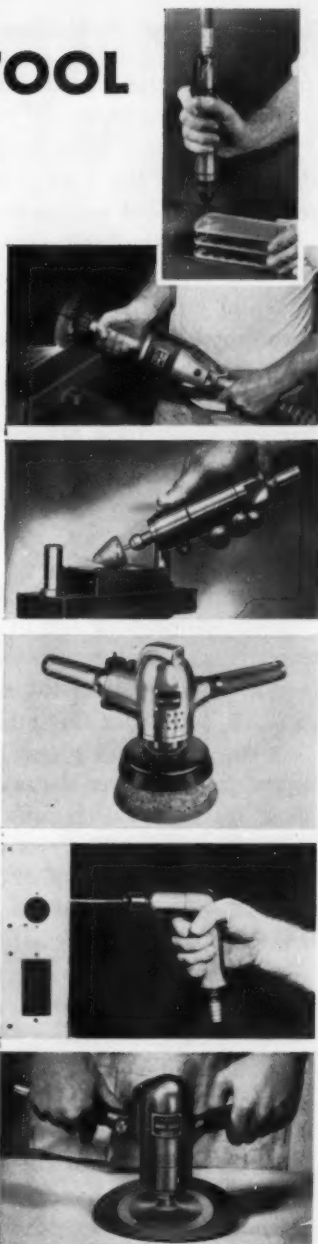
**REPRESENTATIVES** in principal cities of U.S.A., Canada, Mexico, Puerto Rico, South America, England, Europe, Italy, Japan, Hawaii

**CANADIAN PLANT:** Brantford, Ontario

**EUROPEAN PLANT:** Vlaardingen, The Netherlands

For more data circle 390 on Postpaid Card

March, 1961



MODERN MACHINE SHOP

97

## **Supervisory Problems . . .**

any political group or theorem restoring our prestige among nations overnight.

Having studied these workers through the dark '30s, the wild '40s, and the hazardous '50s, I am positive that they, rather than any political group, must be accorded recognition for keeping this country of ours on a fairly even economic keel through some very trying years.

These are the people who fight and win wars when this is necessary, either in uniform or within our shops. These people also love peace and favor anything short of abject appeasement in efforts made to preserve even an extremely shaky peace. They do not favor efforts to purchase the goodwill of everybody, nor are they happy about that letting-down of economic barriers which most assuredly places their hard-won standard of living in jeopardy.

These are the greatest craftsmen on earth, but they dislike being forced to compete with coolie labor maintaining the lowest possible standards of living.

It would probably be stupid for the supervisor to attempt to justify all of the well-intentioned acts of our politicians over the past 30 years. But it is essential that this supervisor, by virtue of his own powerful faith in our way of life, continues to prove, through his daily words and acts, that the situation facing our economy is by no means beyond repair.

A supervisor may well be unhappy about many of the things he reads and hears about all over the world, but in his relations to his subordinates, he must maintain and register a cheerful, forward-looking attitude of confidence. He can do this even though he fully appreciates every detail in foreign and domestic affairs which distress the worker as well as himself.

It may even be that he can at this moment discern more encouraging trends in world affairs, with perhaps a more resolute resistance to the encroachment of world communism. If so, he has the duty of conveying this hope to his subordinates, and of proving his faith in the future by his acts of kindness, his firmness when dealing with anti-Americanism, and his co-operation with both his workers and his supervisors during those decisive days and years ahead which will determine whether we shall continue as a nation of free people.

This restatement of the verities propounded by Abraham Lincoln apply with even greater force today than they did when he enunciated them 100 years ago.

# New **ARMSTRONG** Swivel Pad can't come off



Now ARMSTRONG deep throat "C" Clamps have the new (Pat. apd. for) ARMSTRONG Ball-joint Swivel Pad. This "C" Clamp pad, developed by ARMSTRONG Engineers, is tougher than any on the market. Rigorous testing in our own plant first proved this fact, and field tests in factories throughout the country have confirmed our own test results.

**Here's Why it's  
STRONGER...**



The lip of the opening in the ARMSTRONG Ball-joint Swivel Pad is undercut so that when the ball of the screw is inserted, and the lip is permanently forced down, a solid steel wall is formed, inside the pad cavity, completely encircling the ball.

This wall of steel makes it impossible for the pad to come off the screw during normal use. In fact, our tests have proved that it is virtually impossible to intentionally knock the pad off with a hammer—yet the pad is free to swivel through an arc of approximately 40°.

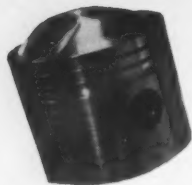


**Call your ARMSTRONG Distributor**

Your ARMSTRONG Distributor can offer delivery from stock on this "400-Series" deep throat, drop-forged "C" Clamp with the new Ball-joint Swivel Pad. He also carries in stock the other styles of clamps in the ARMSTRONG Line—the broadest line of drop forged "C" Clamps.

**ARMSTRONG BROS. TOOL CO.,** 5228 W. ARMSTRONG AVE.  
CHICAGO 46, ILLINOIS

For more data circle 391 on Postpaid Card



**Forgedtrue - Chrysler  
S-K boat piston of  
15 to 1 compression.**

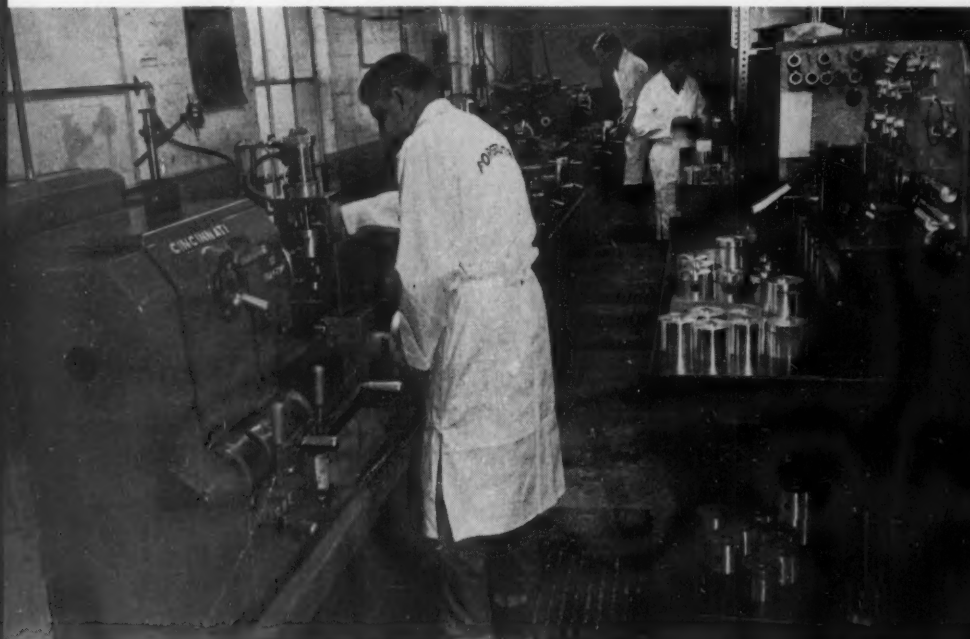
# Producing Aluminum

**A pictorial outline of operations  
performed in manufacturing  
100 percent virgin nickel base  
aluminum alloy pistons.**

**By CY LA TOUR**

**Forgedtrue Piston Corporation,  
of Pasadena, California,** manufactures what is believed to be the strongest, lightweight pistons made. The pistons, which are the result of

nearly a score of years of testing, research and use under the most exacting conditions, are made from alloy No. 2018-F, 100 percent virgin nickel base aluminum alloy (Rolls-

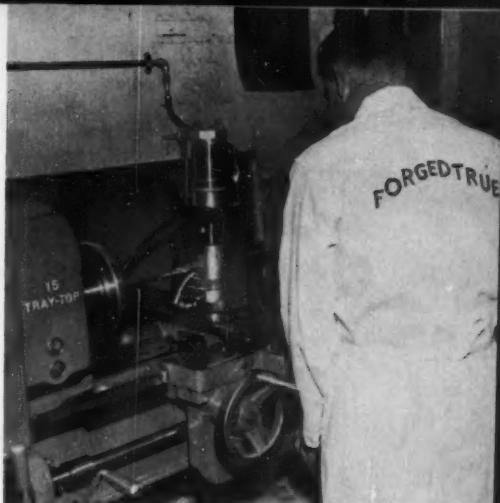


**Battery of Cincinnati Tray-Top lathes where drilling, boring, ring grooving and shaping operations are performed in the Forgedtrue Piston Corporation plant in Pasadena, California.**

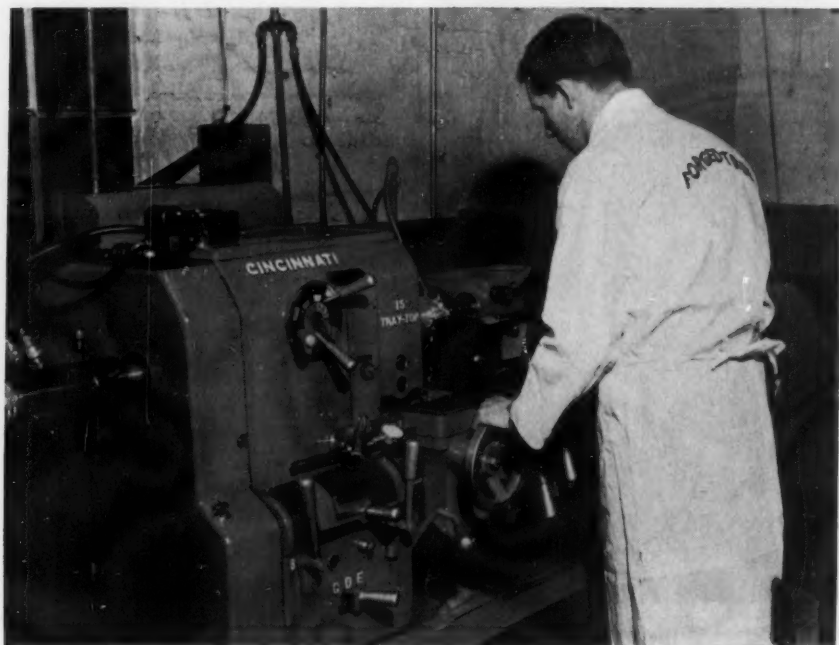
# Alloy Pistons

Royce aircraft material). Alco weighs, cuts and ships "slugs" to the Santa Monica branch of Douglas Aircraft where they are forged and delivered to Forgedtrue Piston Corp.

The internationally famous pistons, which have been used by the winners of the Indianapolis "500" auto classic ever since Arthur Sparks, now president of Forgedtrue Piston Corporation, perfected his first set of pistons in his home garage experimental shop in 1946, have become not only a by-word in the realms of competitive speed on American and

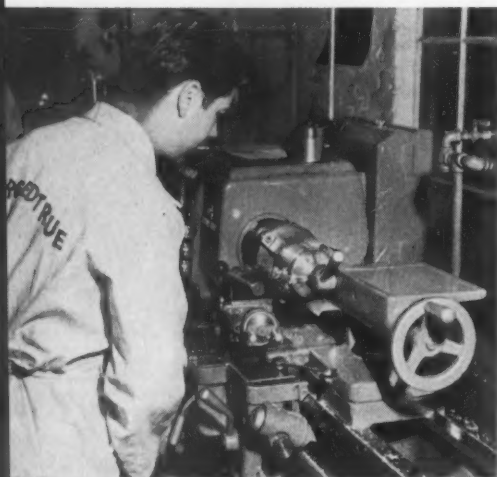


Close-up view showing operator drilling and boring piston for wrist pin in plant of Forgedtrue Piston Corporation. Air-chuck holds piston in place during boring operation.



This illustration shows a ring grooving operation being performed by operator on a Forgedtrue Piston. All ring grooves are formed with the aid of solid carbide forming tools.

**"... pistons are made under a patented process ..."**



Cincinnati Tray-Top lathe is used to relieve the head after ring grooves have been cut.

foreign race courses but are synonymous with the "winners". Prior to World War II considerable difficulty was encountered with pistons of various manufacture for racing and high output engines because of the alloys and the processes of manufacture that were used. During World War II, the American and British governments spent millions of dollars for the development of an alloy for reciprocal engine pistons. Rolls-Royce developed a high nickel base alloy known as R-R piston alloy.

While the war continued, nickel became more critical. During this time, Dr. L. O. Berger, head of the testing division of Dayton Aircraft Testing Laboratory (a close friend of "Art" Sparks) was placed in charge of research and experimental work for this nation. He is given credit for having produced the alloy now used by Forgedtrue Piston Corporation to make its pistons.

Forgedtrue pistons are made under a patented process (patent No. 2740591 — seven claims and two basics) using virgin prime alloy No. 2018-F (Rolls-Royce aircraft material). The pistons are available in an oil control type for street use and a racing type for competition use. Pistons are supplied for all engines with bore sizes from 3 9/16 to 4 3/8 inches in most any stroke and connecting rod combination.

Due to variance in cam designs, pistons are made to a median, and then must be adapted to the best advantage for each compression ratio. Forgedtrue's exclusive extruded process, or open cavity forging, allows for exacting standards and



Using a Van Norman piston grinder, pistons are turned and ground to customers' specifications. In this illustration, the piston is being turned using a modified "D" cam.



**"... process allows for flexibility of design ..."**

flexibility of design which are said to insure at least 50 percent greater yield strength, a tensile strength of 60,000 p.s.i., 10 times greater elongation, 38 percent faster heat dissipation, and at least 25 percent lighter weight than cast iron pistons.

Although Forgedtrue has been producing lightweight pistons for more than 14 years, thereby creating an international market for its high precision product, the company has recently announced the development of an even more revolutionary piston, in step, so to speak, with the "jet age"—the Thorium-Magnesium piston. Under test for nearly two years, these pistons even now, although to date well proven, are still undergoing further testing and will undoubtedly be one of the greatest contributions for today's high compression engines. The new pistons are lighter and make possible maximum r.p.m.'s in shorter distances and many seconds faster than heretofore.

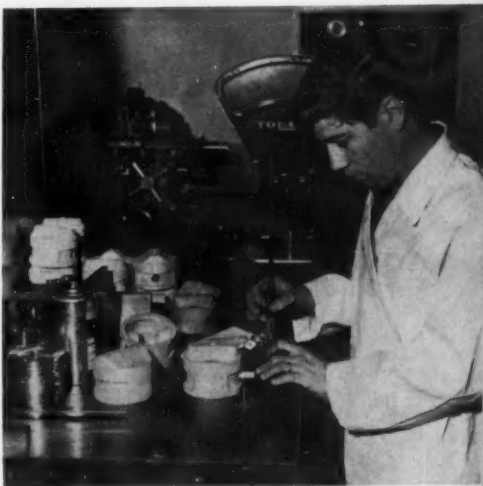
★ modern machine shop ★

**Press Brake Dies.** Dreis & Krump Manufacturing Co., 7418 S. Loomis Blvd., Chicago 36, Ill., has published a new book on press brake dies. This book, in 11 sections of 134 pages, provides a comprehensive treatise on the design and applications of the different bending and forming dies and punching units for press brakes. A complete table of contents and section indexes enable quick reference to dies for bending, forming, and punching.

While this book carries a price of \$3.00 per copy, a copy is available to any press brake user by request.



*Pistons are carefully balanced to within plus or minus one half gram using a Nichols mill.*



*Operator at Forgedtrue is shown performing an inspection operation on a piston. Pin hole alignment is accurately checked to a tolerance of plus or minus 0.0005 inch.*

# Routing Non-Ferrous Aircraft Parts

Routing fuel transfer slots in lower wing stringer for DC-8 jet transport airplane. ▶



***Survey shows that precision routers can successfully compete with large automatic equipment in some types of production work.***

By H. F. ROBINSON  
Facilities Engineer, Long Beach Division,  
Douglas Aircraft Company

**How can the small shop operator cope with the competition** created by large automated machines or servo-hydraulic installation which may cost more than the small shop's total capital investment? Practical and easily comparable conditions under which a non-theoretical answer could be obtained to this question were created in the shops at the Long Beach, California Division of Douglas Aircraft Company at the beginning of the company's massive DC-8 jet transport airplane production program.

The Douglas shops were already well equipped with the big automatic mills and servo-hydraulics. But it

was soon evident that the demand for high precision machined non-ferrous parts would quickly exceed the combined production potential of these monsters. The question then arose—should the number of automatics and servo-hydraulics be increased, or were there less costly machines available which could effectively relieve these big fellows of a part of their load?

A comprehensive survey of the machine tool field brought to light a heavy duty radial arm router. While there is no logical physical comparison between this particular router, which is marketed under the trade name Wadkin, and the servo-hydrau-

**"... survey made to establish current status of routers."**

lics, there is a lot to be compared in the types and qualities of the work it can accomplish.

The general construction of the Wadkin router can be noted in the accompanying illustrations. It consists of a main column or base surmounted by a swiveling barrel which rotates in low friction ball bearings, and provides the radial motion. The radial arm slides in and out of this barrel on Nitralloy hardened rods. The router head is mounted on the end of the radial arm and contains, along with the motor, precision slide facilities for moving the head up and down, for adjusting it at different heights beyond the range of its movable travel, and other precision adjusting, locking, and measuring devices to aid in precision work.

While there are many optional factory-built accessories for this router, such as a power rise and fall table, accessory power tools, and a full line of cutting tools, a main advantage of the machine is its adaptability to a wide range of simple but specialized tools, designed locally and built to accomplish a specific

job. One of these advantages accrues from the coaxial relationship between the stylus and cutter.

Though normally a two-axis machine, the "Z" axis can be provided by incorporating an inclined plane guide in the tooling to provide controlled rise and fall of the head as the work progresses. Other locally designed devices can be added when desired to increase efficiency and accuracy, such as a hydraulic check mechanism on the head to automatically control cutter depth, pneumatic raising and lowering devices, or permanently attached dial gages for extremely accurate movement limits or adjustments.

A comprehensive survey made recently to establish the current status of routers in DC-8 production work provides specific data which will go a long way in answering the industry-wide question posed at the beginning of this article.

**Question:** What is the present productivity ratio between servo-automatic machines and routers?

**Answer:** When a job can be accomplished on a router, it can be pro-



**Close-up of routed fuel transfer slots.**



**Typical cut accomplished through routing.**

**"... parts produced in less time by routing ..."**



**Routing ventilator exit slots in cabin trim used on the DC-8 jet transport airplane.**

duced, on the average, in one-third the time required for servo-automatic production. This makes the productivity ratio 3:1 in favor of routing.

**Question:** A large number of window frame doublers must be made for each DC-8 turned out. What is the floor-to-floor time comparison between producing these parts by routing and production on a servo-automatic?

**Answer:** The parts can be produced in 28 percent less time by routing, using current tooling. With improved tooling, this could be increased to 40 percent less time.

**Question:** Compare the surface finish obtained by routing against those obtained on a servo-automatic.

**Answer:** Due to the high r.p.m. of a router cutter, the surface finish obtained by routing is generally better.

**Question:** How about accuracy comparison; i.e., repeatability, dimensional accuracy, and finish?

**Answer:** In general, the repeat-

ability and finish may be considered equal for both machines. A router will have from 0.003 inch to 0.005 inch greater dimensional errors due to hand operation. Thus, parts which can encompass this margin of error must be selected for routing. For a very fine finish along with great dimensional accuracy, some parts are first surface finished on a router and then finish-dimensioned on a servo-automatic.

**Question:** To what extent does operator fatigue affect performance on either machine?

**Answer:** From 8 to 12 percent on servo-automatics; from 15 to 22 percent on a router. These figures are most noticeable toward the end of the workshift. However, the greater productivity of a router offsets this fatigue disadvantage.

**Question:** What other disconcerting factors affect the operators?

**Answer:** None on the servo-automatics. In routing, chips, coolant splash, noise, and the fact that the operator must wear a jacket and face mask affect his performance adversely from 3 to 5 percent.

**Question:** How about tool life comparisons?

**Answer:** Not meaningful.

**Question:** How about fixtures and perishable tooling costs?

**Answer:** Not directly comparable. On a router, such costs can be greatly minimized by standardizing on the guide collars used in template tracing. When these standard sizes are taken into consideration during template layout, the same guide collars can be used for numerous parts.

**Question:** How about set-up times?

**Answer:** Set-up time on a router will average 50 percent less than on the tracer-controlled mills. Coordination is built into a router template. On the automatics, the template and fixture must be coordinated first, then these must be coordinated with the machine.

**Question:** What about machine maintenance?

**Answer:** The only router maintenance required is on the high speed motor bearings.

**Question:** What about operator costs?

**Answer:** Routing is accomplished by a Profile Duplicator, a work classification that carries a lower wage scale than that of the Profile Machinist used in automatic mill operation.

**Question:** What is the operator attitude toward a router?

**Answer:** As different as human nature. Some don't want to work on a router; some don't want to leave once they have tried it out!

A careful analysis of these shop-tested survey results, as might be expected, leads to no definite conclusions. They certainly don't establish that one type of machine is "better" than the other in all cases. They don't in any way detract whatsoever from the value of the big automatics, or do they establish routing as a low-cost cure-all for shop production problems.

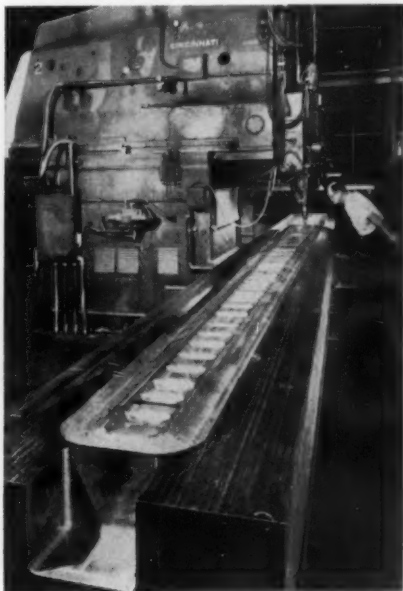
But from the standpoint of the small shop without big automatics to work with, and without the necessary capital to purchase such equipment, the results establish the fact that precision routing can successfully compete with the big automatics in many types of production work, and that in certain types of work, a

precision router may have a slight edge in higher productivity at somewhat lower cost.

★ modern machine shop ★

## Record-Size Die

To produce a record-size closed die forging, a record-size die must be sunk. At Alcoa's Cleveland works, fillets are put on the ribs of a 14-ton die 14 inches thick, 26 inches wide, and 272 inches long. The die—actually the top half of a die—was installed in a 50,000-ton press to shape what is believed to be the longest closed die forging ever produced. The part is a wing spar for the T-39 Sabreliner, a new twin jet utility plane which was developed by North American Aviation, Incorporated.



A 14-ton die for producing jet plane wing spar is machined at Alcoa's Cleveland works.



# Welder Manufacturer Reverses Import Trend

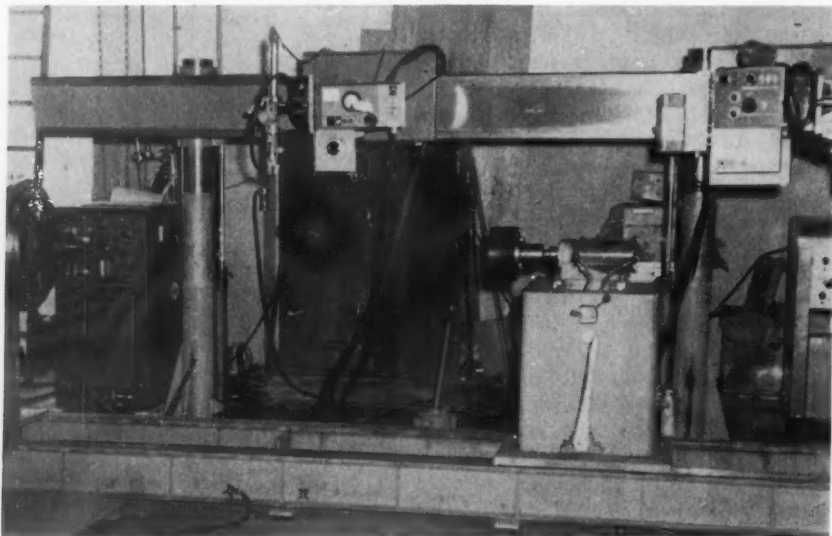
***"Build a better machine and the world  
will seek out a pathway to your door."***

By BARTLETT WEST

Someone once said . . . "Build a better mouse trap, and the world will beat a pathway to your door." But after the year 1960, officials at Airline Welding and Engineering Company, Gardena, California, are convinced that this old adage should

be revised and brought up to date. The current version should read . . . "Build a better *machine*, and the world will *seek out* a pathway to your door!"

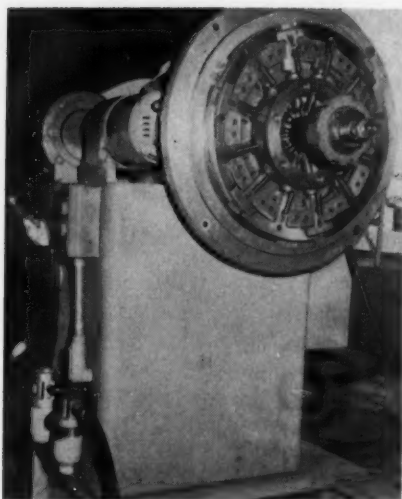
This happened at Airline Welding and Engineering Company during



Partial view of nearly completed circumferential welder being built for Avro of Canada. Headstock is visible at the far left. Note twin

welding heads. Note also the rigidity of heavy framework which is claimed to assure operational alignments within 0.002 inch.





*Close-up of the circular headstock tool plate to which any type of holding fixture can be bolted. The fixture shown is intended for F-104 jet fighter airplane wing tanks.*

1960. In the past year, precision thin gauge automatic butt welding machines have been sold and exported to firms in England, Canada, France, New Zealand, and Australia. An order for another is pending with a firm in Holland, and sales negotiations are in progress with several more European NATO countries.

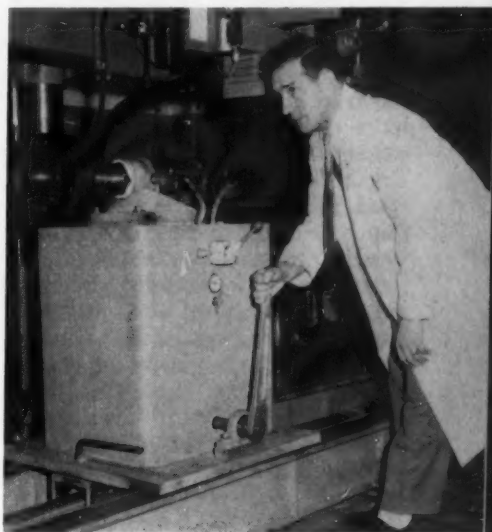
And all this without foreign advertising, publicity, or fanfare of any type!

How, then, did these foreign customers learn about Airline Welding's precision machines? It was by the "seeking out" process described in the revised edition of that old adage.

Here is a brief summary of how in one case this "seeking out" process works backward until it reaches the company making a superior machine: The Aeronautical Group of A. V.

Roe (Avro), Canada, Limited, was licensed by Lockheed Aircraft to produce wing tanks and pylon tanks for the F-104 jet fighter airplane. Engineers from Avro found their way to Monrovia Aviation, Monrovia, California, a local producer of these same components, to study the production techniques employed. Several of Airline Welding and Engineering Company's precision circumferential and longitudinal thin gauge butt welders were being used by Monrovia Aviation. Avro engineers, without further inducement, then approached Airline Welding and Engineering Company, and an order for not one, but two—a longitudinal and a circumferential welder—resulted.

When asked how his company managed to reverse the trend of importing high precision, specialized



*Technician moves tailstock along ways with ratchet device coupled to gear and gear track. Air cylinder clamps tailstock against work.*

**"American machines must be made better . . ."**

machines, Byron Russell, president and owner, had this to say . . .

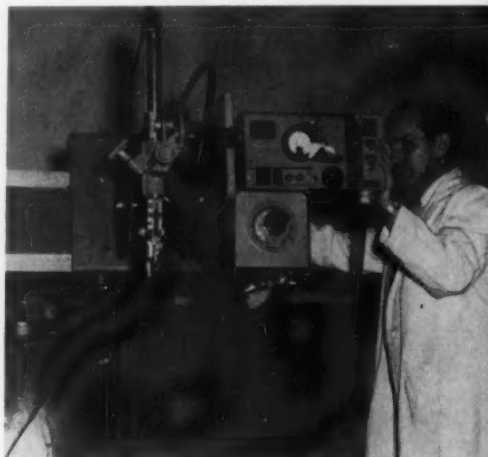
"First, by building a better, more precise welder than was available in foreign markets. Secondly, by avoiding over-specialization—by designing the machines so that they can be easily adapted for other work once the specific work for which they are purchased is completed. Third, and just as important as machine design itself, by allowing the customer to send his technicians into our own shop where they can be thoroughly trained in proper machine operation, in how to recognize good work from bad work, in machine maintenance, and in all the technical data that is relevant to successful thin gauge butt welding."

At the time of this writing, the welders for Avro were nearing completion. Technicians from Avro have literally lived with these tools since the base structures were laid. They have studied and operated similar welders in Airline Welding and Engineering Company's job shop department. They have digested and applied all the technical data that pertains to proper machine adjustments and operation. When the welders are shipped to Avro, these technicians will go along with the machines, carrying with them an advantage without which any machine, regardless of its precision or its degree of automation, is bound to be less efficient—an understanding human element.

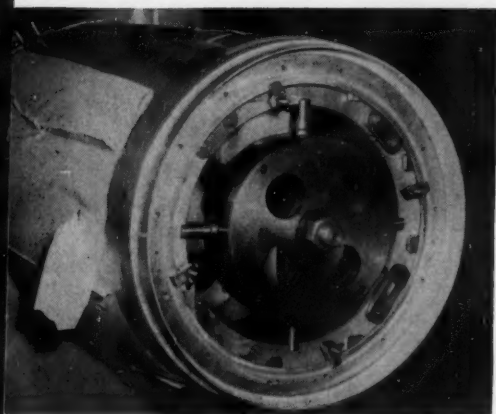
The illustrations with this article of the circumferential welder being built for Avro will visually bolster Russell's statement that to combat

importation of foreign machines, and to actually reverse this trend, American machines must be made better and more versatile than their foreign counterparts, and provisions must be made to assure expert operation and maintenance of the machine after it has been installed on the production line.

While the explanations with each illustration are rather complete, a few side remarks will vivify the story they tell. This machine has an adjustable spread of 10½ feet between the head and tailstocks. It can perform a circumferential butt weld on components up to 60 inches in diameter, and on material down to 0.020 inch in thickness. The basic head-stock plate is simply a drilled circular tool plate to which any type of work-holding fixture can be bolted. The



*Here an Avro technician studies one of the welding heads. This knowledge will stand him in good stead when the machine is shipped to Avro and put in use on the production line.*



*Removable back-up plate used during circumferential welding of the F-104 wing tanks.*

fixture shown is the one used for holding the F-104 wing tanks.

Note also that the welder mounts two welding heads, one for MIG (metallic inert gas) welding, the other for TIG (tungsten inert gas)

welding. Either of these heads can be moved into any desired welding position along the rigid double V-type track on which they are mounted. Changing from one type of welding to the other requires only time for head setup and adjustment.

Rigidity of the frame assures alignments of within 0.002 of an inch between all adjustable welding and holding components. All operating components (clamping devices, tail-stock clamping thrust, head raising and lowering, and so on) are pneumatically actuated.

The only human figure shown in these illustrations is that of an Avro technician, studying, probing, trying out, learning as the welder progresses toward completion. When this welder is installed on the Avro production line, there will be no production delays whatsoever while "writing back to the factory" for operational, adjustment, or maintenance advice!



**Machinability Report.** Publication of Volume IV of the U.S. Air Force Machinability Report, "Machining Characteristics of High Thermal Resistant Materials," has been announced by Curtiss-Wright Corporation. The newly published volume is the fourth in a series of books published by Curtiss-Wright in cooperation with the U.S. Air Force and various industrial firms and widely distributed throughout industry in the past ten years. It is a study of machining characteristics in turning, milling, drilling and tapping conducted on 25 high strength thermal resistant alloys. Relationships are presented between tool life, cutting speed,

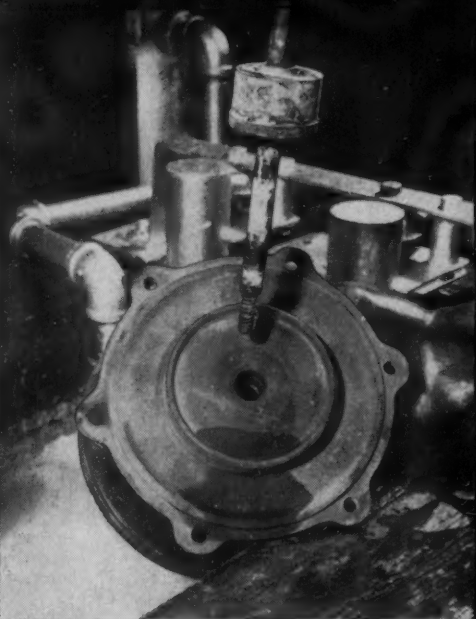
feed, tool geometry, tool material and cutting fluids.

Volume I, published in 1950 and Volume II, published in 1951, on metalworking research and the machining of commonly used metals, are now out of print. A limited number of copies of Volume III, "Titanium," published in 1954, are still available.

Inquiries and orders for Volume IV of the Air Force Machinability Report should be directed to: Order and Contract Department, Curtiss-Wright Corporation, Wright Aeronautical Division, Wood-Ridge, N. J. Since the book was printed at Curtiss-Wright's expense, a charge of \$4.60 is made for each copy ordered.

# Cleaning Turbocharger Parts

Fig. 1—Probe, with approximately 100 tiny holes, drilled at corresponding oil passage angles, is inserted through the bearing bore of a turbocharger center housing. Detergent sprays and compressed air are forced through the holes at high pressure.



**Plant engineered setup proves highly efficient  
for the thorough cleaning of all diesel engine  
turbocharger parts prior to assembly.**

By GILBERT C. CLOSE  
Field Editor, Modern Machine Shop

A major requirement at the Garrett Corporation's AiResearch Industrial Division, where turbochargers for diesel engines on both construction equipment and trucks are being built, is thorough cleaning of all parts prior to assembly. These units operate at speeds as high as 90,000 r.p.m., and the slightest amount of dirt on a moving surface, and especially a machine chip, could quickly cause serious damage.

A special cleaning problem was presented by the turbocharger cen-

ter housing. These parts form an enclosed structure and receive extensive internal machining. Thus, there are many enclosed machine chips which must be removed by some sort of pressure flushing action.

To assure quick and thorough internal cleaning of these parts, company engineers designed and built their own flush-cleaning equipment. The simplicity of this equipment, its relatively low cost, and its ability to produce "surgically clean" internal surfaces and oil passages indicate that many shops faced with flush-

**"Each unit can handle six turbocharger housings . . ."**

cleaning problems could design and build similar units and use them to great advantage.

The flush cleaning equipment consists of two caster-mounted portable units with welded angle iron frames supporting wooden tanks approximately 12 inches wide, 12 inches deep, and 6 feet long. The tank on the solution cleaning unit has a solid bottom and is lined with plastic. The solution remains in this tank and is recirculated from it during parts cleaning. The tank on the oil flushing unit has a wire mesh bottom so that the recirculating flushing oil can drop directly through into a twin filter system (containing one magnetic filter) and then back into

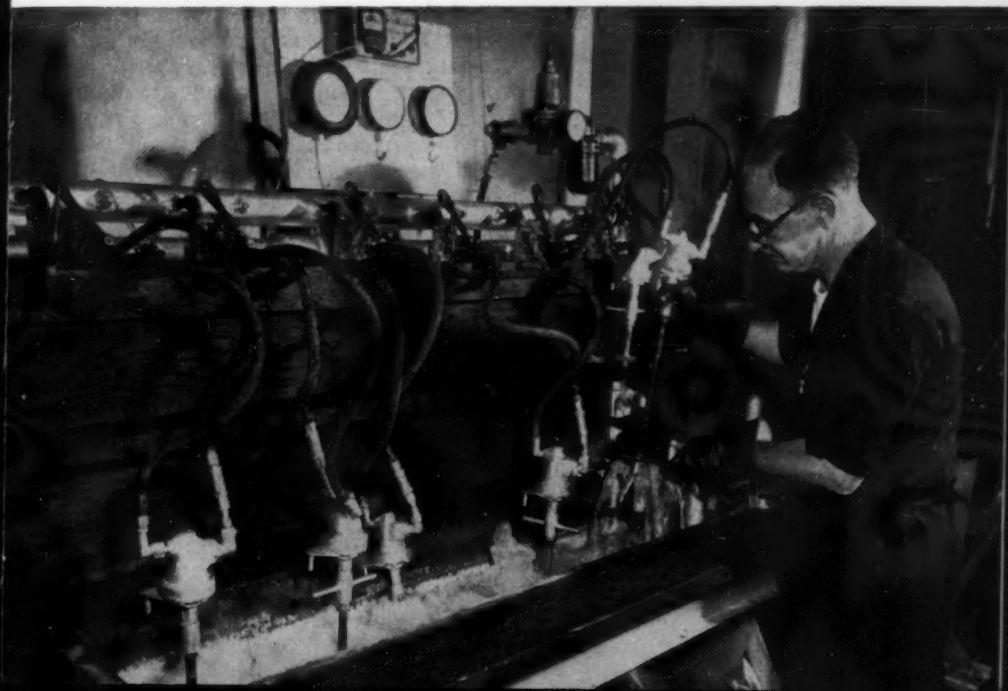
the storage tank from which it is recirculated by pumps and electric motors. Each cleaning unit can handle six turbocharger center housings at a time.

The solution cleaning unit is equipped with six hose-mounted metal probes, as shown in Fig. 1. These probes have about 100 small holes drilled in them at different angles. In actual cleaning work, the probe is inserted in the housing and the solution is force pumped through. The varied angles of the drilled holes assure solution contact over the entire interior surface and through the oil passages.

A combination liquid detergent phosphate and water solution is used

**Fig. 2—View of turbocharger unit, held by operator with probe inserted, shows detergent flowing out bottom after being sprayed**

**through oil channels. Other units being cleaned are submerged in tank. Two hoses lead to each probe—one for detergent, one for air.**





**"Flushing oil is admitted through air-tight fittings . . ."**

for this first flush-cleaning operation. It is pumped through the housing at 50 p.s.i. pressure and 140-degree F. temperature. The solution flow alternates with an air blow at 50 p.s.i. and this cleaning cycle continues for 6 minutes.

As can be noted in the illustrations, the turbocharger center housings are completely immersed in the solution during this cleaning cycle. The action of the phosphoric acid on the external surface of the part forms a phosphate coating which not only prevents any surface corrosion until the parts are painted, but provides

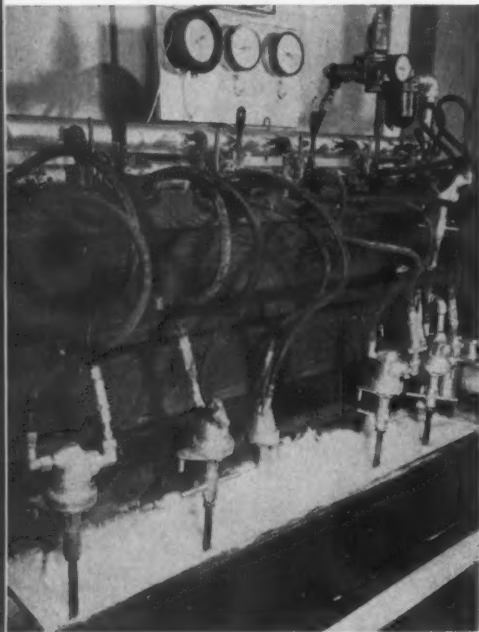
a superior bonding surface for the subsequently applied paint.

After this initial flush-cleaning cycle, the parts are painted and are then ready for oil flushing. Although the flow during solution cleaning is opposite the direction of oil flow during turbocharger service, thus providing a back flushing action, the flow during oil flushing is normal. The flushing oil is admitted through air tight fittings near the periphery of the housing, flushes through the oil passages, and comes out at the center of the housing. The oil is pumped through the part at 75 p.s.i. pressure and at 180-degree F. temperature for a period of approximately 5 minutes.

According to company engineers, this hot oil flushing simulates and has the same effect as the normal turbocharger run-in period when the turbocharger is mounted on an engine. It loosens and removes any metal chips that may have withstood detergent cleaning action. At the same time it provides the part with an overall oil coating to protect it until assembly. Additional protection is provided by sealing the oil-coated part in a plastic bag until it is needed on the assembly line.

Both the detergent cleaning and oil flushing units are instrumented for accurate pressure and temperature control. The detergent unit is equipped with an automatic pH indicator to keep a constant check on solution alkalinity.

Time studies indicate that it takes a workman approximately one minute to remove one part and set up another for either detergent cleaning



**Fig. 3—A full compliment of six turbocharger center housings being cleaned at one time.**





*Fig. 4—Operator prepares to place center housing into air-tight fitting for hot oil flushing. Oil goes through Y-shaped hose attach-*

*ment under 75 p.s.i. pressure, purges oil channels in housings, and comes out through center in normal operating flow direction.*

or oil flushing. Thus, with six parts in each unit, and with a 6-minute detergent cleaning cycle and a 5-minute oil flushing cycle (neither of

which are critical), the operator on each unit can work steadily at his job, replacing in sequence the parts that are to be cleaned or flushed.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

**Welding Data Book.** A new edition of its pocket-size Maintenance Welding Data Book, including new application and design data, has been published by Eutectic Welding Alloys Corp., Flushing, N. Y. The 148-page illustrated publication is the Seventh Edition of the Data Book. In addition to providing a guide, indexed by application, to nearly 200 different Eutectic welding rods,

electrodes, and chemical aids, the Data Book illustrates and explains general welding techniques and joint design hints. Other topics include new time, work and money-saving applications for welding; elimination of warping, distortion, embrittlement and other base metal damage; and data on obtaining improved wear, impact, corrosion resistance, color match, and machinability of welds.



## Expanding Working Capital in the Metalworking Industry

By THEODORE H. SILBERT

**The volume of commercial finance loans and factors' funds flowing into American industry** is currently at the rate of about \$15 billion a year. Of that sum, about \$39,000,000 is flowing into the machine shop industry this year.

Commercial finance loans and factors' funds are second only to bank financing in the machine shop industry. In the main, the proportion of bank loans in the machine shop industry is decreasing, while commercial finance loans are increasing. *This is a direct result of the Federal Reserve Board's tightening of bank credit during the last two years.*

For the last 10 years, money has become progressively tighter. There is some temporary relaxation today, but the whole trend is towards tightness. The Federal Reserve Board's policy has resulted in limiting the increase of the nation's money supply to about 1 percent a year. That is far less than the normal increase of about 3 percent a year in pre-war days. This cuts down business working capital.

Many machine shops could expand their sales volume if they could get sufficient seasonal lines of credit to carry peak inventories, pay peak

labor, and finance peak receivables. But with bank credit tight, the typical manufacturer finds his expansion and profits held down by shortage of working capital.

Many a machine shop company with a sales volume of (say) \$300,000 a month could increase its monthly sales by (say) \$100,000 for a total of \$400,000, if additional working capital were available to support the increase in sales. And as for profits, the additional \$100,000 in monthly sales should generate at least \$8,000 in monthly net profit before taxes, or about \$96,000 over the year—which is about \$48,000 after taxes.

The working capital to handle this \$100,000 in additional sales would be available through a commercial finance company, and the charge would be about \$500 a month (depending on the size of the borrower, the variety of customers, size of typical invoices, and so on). This would leave about \$6,500 in larger monthly profit before taxes made possible solely because of the funds advanced by the commercial finance company. Cash purchase discounts could add several thousand to this profit figure, the amount depending

on the annual purchases made by the company.

**With bank credit still rationed,** *the machine shop executive management's problem can be solved by turning to a commercial finance company and raising the extra working capital by borrowing on his accounts receivable.* This financing takes the form of a revolving fund secured by the 30, 60 or 90-day trade receivables. Unlike most other types of borrowing, accounts receivable financing is self-liquidating. The advances against the receivables are liquidated as the receivables are collected by the manufacturer.

A bank loan must be negotiated as to amount and becomes due in a lump sum or in fixed installments, but receivable financing supplies funds in proportion to the volume of accounts assigned. This ordinarily coincides with seasonal peaks and valleys of the business, with more funds becoming available as sales increase, permitting the increase of inventories needed to fill orders.

Included with this article is the balance sheet of a manufacturer in the metalworking industry—before and after his working capital was increased by accounts receivable financing. This before-and-after balance sheet is shown in order to explain how some manufacturers have been able to expand their production and sales—despite the tight money situation.

**Examination of the before-and-after balance sheet** indicates that as a result of commercial financing, this manufacturer improved his cash position by \$50,000, his working capital increased four times, and his current ratio went from 1.04-to-1, to

1.30-to-1. The company cleaned up its short-term bank loan, wiped out almost half of its payables, and was in a position to take cash discounts on future bills—without taking in partners or selling stock. The commercial finance company made available \$240,000 in accounts receivable financing, and \$150,000 in a fixed assets loan. Both together totaled \$390,000 which permitted this company to expand in sales and profits.

More specifically, this machine shop was able to sell to a certain customer to which he couldn't afford to sell before, mainly because this customer always wanted long dating and then took his sweet time about paying bills. But he was big, and a volume buyer. Then also, the machine shop head was able to add one new product to his line which he had never produced before. Finally, with the availability of liquid working capital, he was able to make some large raw material purchases for cash which he could not swing heretofore.



"This is a direct result of the Federal Reserve Board's tightening of bank credit . . ."

## Expanding Working Capital . . .

	BEFORE	AFTER
<b>ASSETS</b>		
Cash	\$ 0	\$ 50,000
Accounts receivable	300,000	300,000
Inventory	225,000	225,000
Total Current Assets	<u>\$525,000</u>	<u>\$575,000</u>
Fixed assets (net)	280,000	280,000
Other assets	6,000	6,000
Total Assets	<u>\$811,000</u>	<u>\$861,000</u>
<b>LIABILITIES</b>		
Accounts receivable loan	\$ 0	\$240,000
Bank notes payable	190,000	0
Accounts payable	260,000	110,000
Accrued taxes	29,000	29,000
Accrued payroll	10,000	10,000
Accrued insurance	3,000	3,000
Secured loan current	0	50,000
Total Current Liabilities	<u>\$492,000</u>	<u>\$442,000</u>
Long term debt:		
Fixed asset loan	0	100,000
Total Liabilities	<u>\$492,000</u>	<u>\$542,000</u>
<b>CAPITAL</b>		
Total capital	400,000	400,000
Total Liabilities & Capital	<u>\$892,000</u>	<u>\$942,000</u>
<b>WORKING CAPITAL</b>		
Current assets	\$525,000	\$575,000
Current liabilities	492,000	442,000
Working Capital	<u>\$ 33,000</u>	<u>\$133,000</u>
<b>CURRENT RATIO:</b>	1.04-to-1	1.30-to-1

*Before-and-after balance sheet of a manufacturer using accounts receivable financing.*

The upshot of having \$390,000 in financing—of which \$100,000 went into working capital—was the year-end result of about \$500,000 in additional sales, plus improvement of the internal situation with new equipment. Additional profits resulting from such expansion in sales, after deducting all financing costs, were about \$35,000 after taxes in this case.

**Accounts receivable financing** may be long-term or short-term. Merely by continuing to pledge new receivables and liquidating them, a machine shop president may make such financing as permanent as he wishes. The revolving line of credit fluctuates with sales. As shipments increase, cash advances increase, and the revolving fund is used over and over again. Merely by stopping the flow of new receivables, this method of financing can be terminated quickly whenever other methods of raising sufficient capital are available and advantageous.

Accounts receivable financing is a method designed only for prosperous companies whose working capital cannot keep up with the demands of expanding production and sales. No major commercial finance company would invest its cash in a company unless the funds can benefit the client company and stimulate its growth. Receivable financing is not for stagnant companies. More than \$1 billion a month flows into industry through commercial finance loans and factoring. This is exceeded only by the banking system's commercial and industrial loans.

**Among present-day major successful companies** which have grown up with commercial finance help are: Rose Marie Reid Swimsuit

Company, Dow Chemical, Monsanto Chemical, National Airlines, Inc., Lithium Corporation, The Diner's Club, the A. O. Sutton Corporation, the Yoder Corporation, the Rybutol Division of Rexall Drugs, Rudd-Melikian, Inc., Continental Motors Corporation, Dorsey Trailers Company, Famous Artist Schools, Inc., Helbros Watch Co., Helene Curtis Industries, Buitoni Foods Corp., Hazel Bishop, Air Control Products, Inc., United Artists Corp., Clary Corp., Variety Electronics Corp., Avien, Inc., and so on. Each of these companies owes its success to commercial financing in its early days.

Of course, commercial finance rates are higher than bank rates—but the *dollar cost* is not necessarily higher. In borrowing from a bank (for example) on 90-day or 180-day note, the borrower must maintain a 20 percent compensating balance in the bank, and accumulate funds for repayment during the period the loan is outstanding, meanwhile paying in-



"... executive management's problem can be solved by borrowing on accounts receivable."

**"Advances for all these purposes are readily available . . ."**



**" . . . manufacturer or distributor gets the cash immediately upon closing the transaction . . ."**

terest on the total amount of the loan for the 90 or 180 days. In commercial finance, however, if the borrower needs the cash for only 20 days of each month, for example, while he waits for his receivables to come in, the interest charged is only for 20 days.

All of which means that while the rate of interest charged by the commercial finance company is higher than bank rates, the actual dollar cost for commercial finance is often no higher than bank financing. Moreover, the working capital advanced by commercial finance companies is invariably greater and more readily available than through bank financing. Certainly, this is far less expensive than taking in partners or selling stock, and more desirable from the point of view of the original owners.

**Quite often an expanding business needs additional capital not only for labor and materials, but**

for pre-season inventories, or for buying out a competitor, or for purchase of new, income-producing equipment. Advances for all these purposes are readily available through commercial finance companies. Sometimes a manufacturer discovers that he can multiply his sales by selling on installment plan or having his distributors sell on installment plan, with customer payments spread out over a year or two. This, too, is easily arranged through a commercial finance company *whereby the manufacturer or distributor gets the cash immediately upon closing the transaction, and the financing institution carries the installment contracts.*

Actually, a summary statement might be this: commercial finance companies furnish working funds for all constructive business purposes.

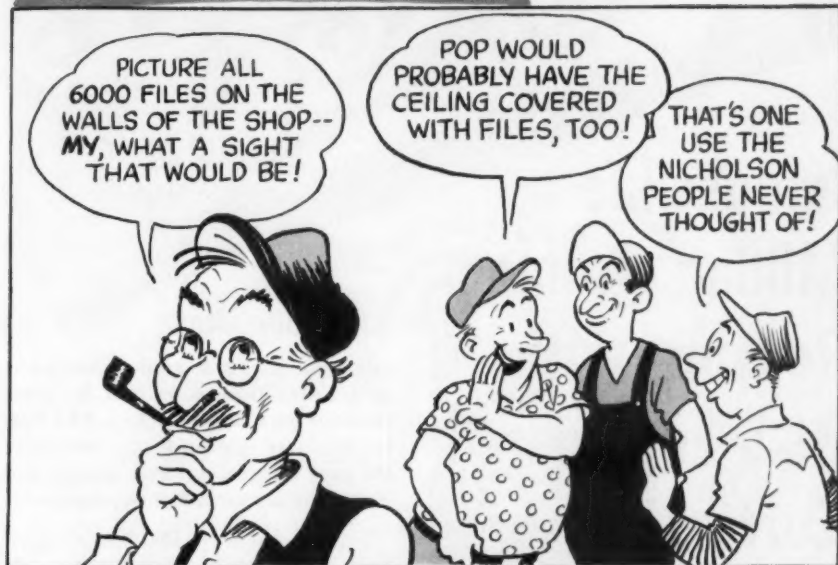


**"Any truth to the rumor our machine oiler won \$50,000 in a basketball pool, Boss?"**





## POP'S School of Filing



Nicholson and Black Diamond files weren't designed for wall or ceiling covering... but to the busy shop man, a complete set of files for his particular requirements is always a pleasant sight... and quite often less than a half dozen versatile file types will do.

The Nicholson or Black Diamond Mill Bastard file is a good example of versatility. It's single cut for draw filing, tool sharpening, smooth finishing of metals

and dozens of other uses... and it looks good on a wall even without the other 6000 Nicholson or Black Diamond files.

Try these files today\*. Remember there's a Nicholson or Black Diamond file for every industrial requirement.

File Philosophy free on request. Write Department S.P.



Industrial Distributors provide the finest goods and services in the least possible time. Our products are sold exclusively through them.

FILES • ROTARY BURS • HACKSAW  
AND BAND SAW BLADES • GROUND  
FLAT STOCK • INDUSTRIAL HAMMERS



# NICHOLSON



NICHOLSON FILE COMPANY, PROVIDENCE 1, RHODE ISLAND

For more data circle 392 on Postpaid Card



# Impossible Milling Problem Routine with B&S Engineered Cutters!



## NOTE:—

In addition to the production benefits engineered into every Brown & Sharpe Milling Cutter—Cutter Service Shops in strategic locations and cutter engineering in your plant are two other EXTRAS to expect when you specify B&S.

*For that **EXTRA** Edge in Production!*

## B&S CUTTER PERFORMANCE

Original attempts to produce the piece by grinding from solid and by other methods were unsatisfactory. B&S Cutter produced pieces for a fraction of the cost of grinding. Part quality and lead accuracy exceeded requirements.

### EXTERNAL THREAD

PART: Locking shaft for hydraulic gate

MATERIAL: No. 135 Nitralloy heat treated to 295 BHN

MACHINING TIME: 45 minutes

CUTTER: B&S, 4P Acme Thread Milling Cutter

SPEED: Part 4/5 RPM, Cutter 96 RPM.

LENGTH OF CUT:  $11\frac{11}{16}$ "

PRODUCTION: 4 Pieces—3 hours of close tolerance, uninterrupted cutting per sharpening

## SEND FOR CATALOG



# Brown & Sharpe

Cutting Tool Division  
Brown & Sharpe Mfg. Co.  
Providence 1, Rhode Island

For more data circle 393 on Postpaid Card

# 3 REASONS WHY SUTTONS ARE THE BEST BUY!

## 1 Serrations

Are  
DIAMOND-  
GRIP!

## 2 Temper and Tension

Controlled  
Heat Assures  
Uniformity!

## 3 Deliveries

Immediate  
Shipment  
of Popular  
Sizes!

## COLLETS AND FEEDERS FOR ALL AUTOMATICS!

### AUTOMATIC BAR MACHINES

STANDARD COLLETS AND FEEDERS;  
MASTER COLLETS AND PADS;  
MASTER FEEDERS AND PADS;  
FULL FLOAT MASTER COLLETS AND  
JAWS; COLLET AND FEEDER  
TUBES; SPOOLS AND BUSHINGS

### TURRET LATHES

STANDARD COLLETS; MASTER  
COLLETS AND PADS

### LATHES AND MILLING MACHINES

COLLETS FOR ALL MAKES

### SPECIAL

COLLETS; TOOLS; CHUCK JAWS;  
HOLDING DEVICES

Write For 28 Page Free Catalog!

Sutton Tool Co.

Dept. MM53 Sturgis, Michigan



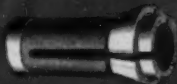
Standard collet for  
ACME-GRIDLEY,  
CONE, NEW  
BRITAIN GRID-  
LEY, and WARNER  
& SWASEY AUTO-  
MATIC BAR  
MACHINES.



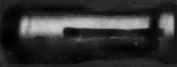
Style "L" master  
feeder with inter-  
changeable and  
replaceable pads.



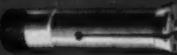
Standard collet for  
BROWN &  
SHARPE AUTO-  
MATICS.



Standard collet for  
4 and 6 spindle  
GREENLEE AUTO-  
MATIC BAR  
MACHINES.



Super (cage-type)  
adjustable tension  
feeder. For all  
Automatics.



Standard collet for  
DAVENPORT  
AUTOMATIC BAR  
MACHINES.

For more data circle 394 on Postpaid Card

# Design for a Hub-Producing Die

***Discussion covers construction and operating details of a compound die for producing a mechanical toy wheel hub.***

By RUSSELL S. KINDT

The tool described in this article is a single-station die which was designed to produce the part shown in the view A-A. The part is a wheel hub for a mechanical toy. The stock is medium soft steel 16-gauge (0.062 inch) 3 inches wide.

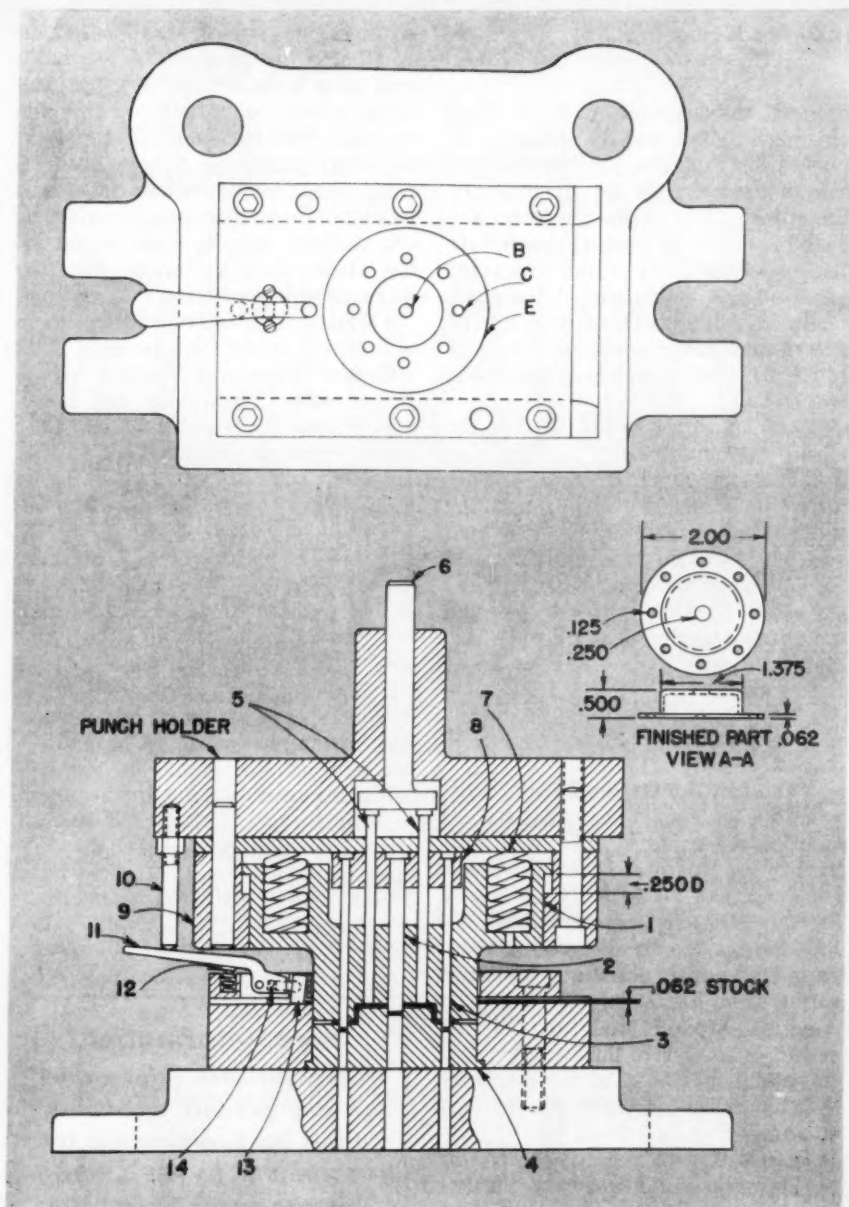
The operation of the die is as follows: The operator feeds the end of the stock against the automatic gage pin (13). The press is then tripped and, as the punch holder moves down, the blanking and forming punch (1) pierces the stock and continues down, carrying the blank into contact with the forming die (4), forming the part and holding it stationary. The punch holder continues down, compressing the ten springs (7) and carrying the punches (2) and (3) down, piercing one 0.0250-inch diameter hole shown at B, and eight 0.125-inch diameter holes shown at C.

As the punch holder moves up, the blanking forming punch (1) remains stationary, being held in place by the springs (7) while the piercing punches (2) and (3) move up and are stripped from the piece. When the punch holder moves up 0.250

inch, as shown at D, the blanking and forming punch (1) contacts the holding ring (9) and moves up, carrying the part with it. The knock-out bar of the press contacts knock-out pin (6) which in turn moves down and pushes knock-out pins (5) down, removing the piece from the punch (1).

Either of two methods can be used to remove the finished piece from the press. The press can be inclined, allowing the pieces to fall clear of the bed of press and into a chute through which they pass into a container, or an air stream can be directed to blow the piece into a chute and then into a container.

The operation of the automatic stop (11) is as follows. The operator feeds the end of stock into contact with the gage pin (13). The gage pin is of 1/4-inch diameter 1/2-inch long stock into the side of which a 5/32-inch hole has been drilled for the 1/8-inch diameter ball which forms the ball joint. The set screw (10) in the punch holder is adjusted to strike the top of lever (11) approximately 1/16 inch before the die is in the closed position. As the lever is de-



Drawing of compound die designed for producing a mechanical toy wheel hub (View A-A).

## Hub-Producing Die . . .

pressed, the gage-pin (13) is lifted clear of the stock and the spring (14) pushes the gage pin (13) against the side of the hole. On the upstroke, as the spring (12) raises the lever, the gage-pin (13) is pushed down into the top of the stock. From this point on, the edge of the hole in the stock made by the blanking punch (1) shown at *E* will be fed against gage-pin (13) until the strip of stock has run out.

The ten springs (7) should be strong enough to keep the blanking and forming punch from moving up until the stock is blanked and the part is formed. When the part is held securely between the blanking and forming punch (1) and the forming die (4), the ten springs (7) will compress, thereby allowing the piercing punches (2) and (5) to pierce the stock.

★ modern machine shop ★

**"The Million Dollar Bend"** is the recently published biography of Charles Eisler, M.E., D. Sc., Chairman of the Board of Eisler Engineering Co., Inc., Newark, N. J. It is a highly readable human document that follows the life of a young Hungarian boy with a natural inventive genius from his initial experiences in America around the turn of the century, through to the founding and successful operation of the company that has borne his name for the past 40 years.

Interwoven with a lively account of the personal and business hurdles he had to jump during his career, the book discusses Dr. Eisler's long list

of inventions which contributed so greatly to the progress of the radio and lamp industry. In fact, the title comes from the patent covering his original bent-tube exhaust method for mass producing tipless stem incandescent lamps which he made available to independent manufacturers without royalty—as indeed he has done with the more than 50 other patents registered to him.

Of particular interest to the technician and student of the field is an extensive appendix liberally illustrated with photographs and drawings of many of his early machines upon which the industry depended. In fact, some of the early Eisler machines shown there are still in use after 40 years and more.

Since Dr. Eisler's own story is also the exciting story of the development of the modern tube and lamp industry as a whole, it includes vivid descriptions of his famous patent fights of the 1920's in behalf of the smaller manufacturers, and his eventual triumph over the combined strength of the giants in the field who had sued him for infringement.

Priced at \$4.75, the book is available from the publishers, the William-Frederick Press, 391 East 149th Street, New York, or from Eisler Engineering Co., Inc., 760 South 13th Street, Newark, New Jersey.

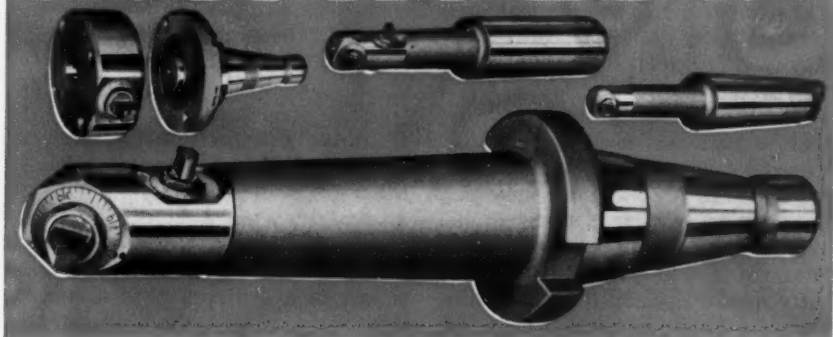
### More Information?

**For additional information  
on any product mentioned  
in this issue, please use the  
READER SERVICE CARDS  
opposite pages 32 and 308.**



FROM DEVLIEG  
microbore®  
precision  
tooling  
center

# MICROBORE



Imitated but never equaled, MICROBORE is the single point tooling system with micrometer vernier adjustment. Designed for all boring, turning and facing operations, the basic MICROBORE system includes over 300 standard single point tools from stock with carbide, ceramic and high speed steel tips • special cluster tooling • Flash-Change tooling • adjustable blade facing heads • tooling with Kendex "throw-away" inserts. And not just a product line, MICROBORE is a complete service comprised of well schooled sales engineers, tool design engineers, highly specialized plant facilities, field service and tool maintenance. Write for complete information.

DEVLIEG MICROBORE • DIVISION OF DEVLIEG MACHINE COMPANY • FAIR STREET • ROYAL OAK, MICHIGAN

MICROBORE • PRECISION TOOLING CENTER

**DEVLIEG  
MICROBORE  
SYSTEM**

For more data circle 395 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 127

# Foolproof That Jig or Fixture

***It will reduce the possibility of scrap, thus providing for a substantial saving.***

By HAROLD SEDLIK

**In general, the use of jigs and fixtures** offers a practical and economical means of performing accurate machining operations without the need of high-priced skilled labor. Inasmuch as labor is considered a fair portion of manufacturing expense, the use of unskilled labor can be a form of considerable saving. However, on the other hand, the use of unskilled labor can be very costly should jigs and fixtures not incorporate certain tool design features.

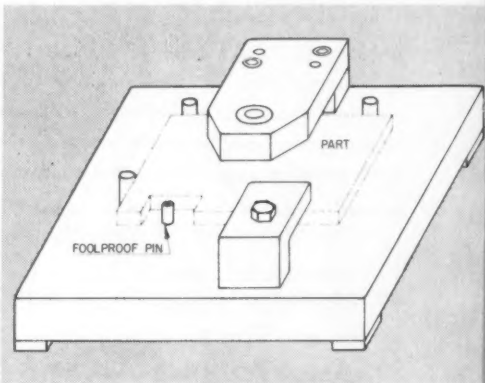
A feature responsible for considerable scrap is the lack of, or inadequate, foolproofing devices on jigs or fixtures. Foolproofing can be defined as the incorporation of certain design features that do not interfere with the loading, unloading and locating of the part, yet make it virtually impossible to place the work in any other way than the correct position.

There are endless means of foolproofing, varying with the shape of the particular workpiece at hand. The most common means to accomplish it is through the use of pins or blocks placed on a jig or fixture in such a position as to clear a correctly located part. However, should a part be incorrectly loaded, the interfer-

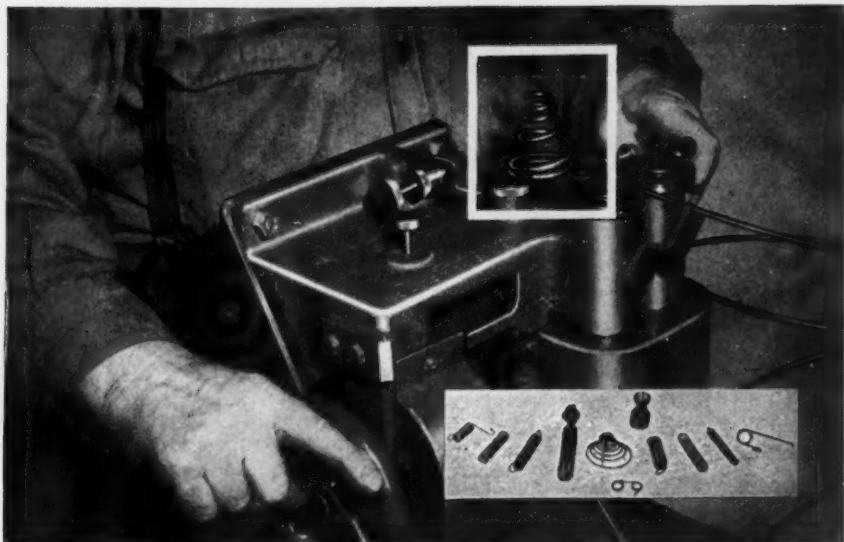
ence from the pins or blocks would prevent it from going fully into position. This warns the operator of his error.

When it is feasible to use pins to foolproof a fixture, for economical reasons rolled or grooved pins should be utilized as they do not require accurately reamed holes as in the case of dowels or solid pins.

The accompanying drawing shows a part in a drill jig. It is necessary that the part be loaded correctly to insure proper location of the drilled



***Drawing of a drill jig incorporating foolproof feature in the form of a roll pin.***



## Any spring made fast in your shop! WITHOUT USE OF ARBORS

For a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005" to .125", you can produce it in a matter of seconds with Perkins Precision Spring Coiler. You eliminate arbors, yet turn out precision springs — torsion, compression, extension, tapered, or special springs, coiled either left or right hand, in any desired length, any diameter from 3/32" to 12" and larger, with or without initial tension, and with

open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications as replacements or experimental work. Make them fast, right in your own shop!



**PERKINS**

MACHINE AND GEAR CO.

Special Machinery Division,  
West Springfield, Mass.



Starrett adjustable jaw cut nippers (left) and Gardener Hook-Kon spring looping tool (center) — handy, precision, time-saving accessories for spring coiling. Perkins Spring Coiler available as bench model or power model shown here, (right) for tool shop or continuous runs.

Perkins Machine and Gear Co.  
Special Machinery Division, Dept. D 2  
W. Springfield, Mass.  
Please send information and prices on  
Perkins Spring Coiler.  
Hand Model ☐ Power Model ☐

Name.....Title.....

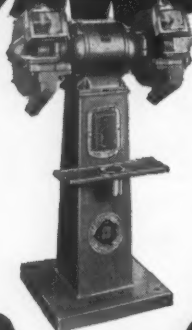
Company.....

Address.....

City.....State.....

For more data circle 396 on Postpaid Card

# 30 DAY FREE TRIAL



- BENCH
- PEDESTAL

## Queen City HEAVY DUTY

- GRINDERS • DISC GRINDERS and BUFFERS

We know what goes into these Grinders and Buffers! That's why we can make this offer.

Point for point—you just can't beat QUEEN CITY Heavy Duty Disc Grinders and Buffers. Built to stand up under hardest use . . . heavy duty motors deliver full horsepower. Wheels, guards, switches, cords, eyeshields are of highest quality . . . selected to deliver long, trouble-free service.

Choose from a complete line of floor or bench types . . . in sizes from  $\frac{1}{2}$  to 10 H.P. and buy them for 20 to 30% under competing makes. Try them for 30 days on money-back guarantee!

**QUEEN CITY  
MACHINE TOOL CO.**

write for  
FREE CATALOG  
TODAY!

3911 KELLOGG AVE.  
Cincinnati 26, Ohio

"Known for Quality for Over 50 Years"

For more data circle 397 on Postpaid Card

### Foolproof That Jig . . .

hole in relation to the cut-out in the front left-hand corner of the part. For correct orientation of drilled hole to cut-out, a hole is drilled into the jig base (diameter to suit a standard roll pin) in the approximate center of the location of cut-out in the part, as shown. A roll pin is then pressed into the drilled hole. The roll pin will serve as a foolproof means, making it virtually impossible to load the jig incorrectly.

The drill jig shown is a simple example of foolproofing a jig through the use of a roll pin. Standard roll pins should take care of about 90 percent of the most common jig and fixture foolproofing applications. For more complex tooling, blocks having special shapes and forms may be required to suit the various conditions. The blocks are usually fastened to the jig or fixture with screws.

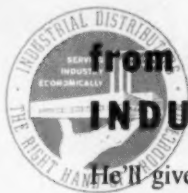
A very high percentage of jigs and fixtures used in production today do not contain any foolproofing features whatsoever. Tool designers should realize that the added expense required to incorporate foolproof features in a jig or fixture will reduce the possibility of scrap, thus providing for a substantial saving. Foolproofing jigs and fixtures can be a form of insurance which is worthy of the very small initial investment.

### More Information?

**For additional information  
on any product mentioned  
in this issue, please use the  
READER SERVICE CARDS  
opposite pages 32 and 308.**

GET THESE HIGH-EFFICIENCY DUMORE TOOLS FOR

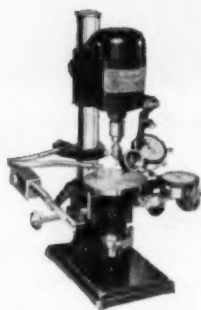
# small hole drilling .001 to $\frac{5}{32}$ "



from your local

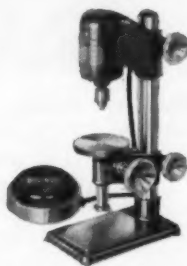
**INDUSTRIAL SUPPLY DISTRIBUTOR**

He'll give you a complete demonstration and show you how to save money, increase production and reduce scrap losses on precision small hole drilling.



down to .001"  
hand operated

**DUMORE PRECISION MICRO-DRILL** — Series 27, with such easily-controlled accuracy that any unskilled operator can learn to use it immediately. A miniature jig borer! Price \$625, FOB Racine.



No. 80  
to  $\frac{1}{8}$ "

hand operated

**DUMORE HI-SPEED SENSITIVE DRILL PRESS** — Series 16, compact, light-weight, with convenient foot rheostat for speed variations. Price \$102.50, FOB Racine.



No. 80  
to  $\frac{5}{32}$ "  
automatic

**DUMORE AUTOMATIC DRILL HEAD**—Series 20, accurately drills  $\frac{3}{32}$ " in steel;  $\frac{1}{4}$ " in brass, aluminum, zinc, cast iron;  $\frac{5}{32}$ " in plastic and wood. Built-in controls. 17½ lbs., 14½" long.  $\frac{1}{2}$ " diam. Price \$237.50, FOB Racine.



You can **DO MORE** with



**DUMORE**

All Purpose  
Precision  
Metalworking  
Tools

Versa-Mil • Drill-N-Tap Units • Drilling Units • Drill Heads • Micro-Drills • Drill Grinders • Precision Grinders • Hand Grinders • Flex-Shaft Tools • Quills and Accessories

Write for details.

**THE DUMORE COMPANY** • 1302 Seventeenth St., Racine, Wisconsin  
For more data circle 398 on Postpaid Card



Entrance to the Pan-Pacific Auditorium, Los Angeles, site of the Western Metal Show.

## "Idea Center for Industry West"

**American Society for Metals to hold  
12th Western Metal Congress and Exposition  
in Los Angeles, March 20-24.**

**Los Angeles will become the metalworking capital of the world** March 20-24 when the American Society for Metals and six participating societies and organizations open the doors to the 12th Western Metal Congress and Exposition. The Congress will be concentrated in the Ambassador Hotel, the Exposition in

Pan-Pacific Auditorium and an adjoining spacious pavilion. Both events are designed to deliver a far reaching impact to advance finer metals, materials and processes for a sounder economy and national security.

More than 100 authoritative metals engineers will deliver papers



**"The Congress and Exposition will serve as comprehensive clearing houses for advanced metallurgical information . . ."**

at Congress sessions held by ASM, Society for Nondestructive Testing, Metallurgical Society of AIME, Society of Aerospace Materials and Process Engineers, and American Society for Testing Materials. The American Welding Society has also been invited to participate. Speakers will disclose late developments for selection, testing and application of metals.

At the Exposition hundreds more technical engineers will occupy front-line or aisle-side positions in interesting and informative displays which represent the year's findings in metals research and development.

Congress speakers and exposition engineers will vie in presenting new thoughts on metals application particularly adapted for plants of the western states. All participants are expected to stress improved quality, economical production and expeditious output.

Since 1929, ASM's Western technical sessions and show, held at two-year intervals, have been focal points for plant executives, metals engineers and departmental supervisors who seek advanced information. In 1959 registration at the Exposition reached an impressive mark of some 41,104 individuals.

Congress sessions will be held mornings and afternoons on the first four days of the education period. Exposition hours are announced as: March 20-21-22: 12:00 noon to 10:00 p.m.; March 23-24: 10:00 a.m. to 6:00 p.m.

New products and processes dis-

cussed at Congress sessions and demonstrated in the Exposition will cover all types of metalworking. They will include alloying, selection, testing, application, heat treating, welding, cutting, burnishing, cleaning, grinding and boring.

The Congress and Exposition will serve as comprehensive clearing houses for advanced metallurgical information recently uncovered through research in various university, government, military and plant laboratories.

The two events, ASM leaders believe, will propel the west's industries on a new, far-seeing career of production. Practically all metals plants situated in that far flung, industrially expansive region will derive benefit.



Technical timeliness of the 12th Western Metal Show is the topic as Host Committee leaders study plans. Pictured from left to right are Wayne A. Reinsch, program chairman, Fred H. Currie, entertainment chairman, and H. A. Curwen, conference chairman.

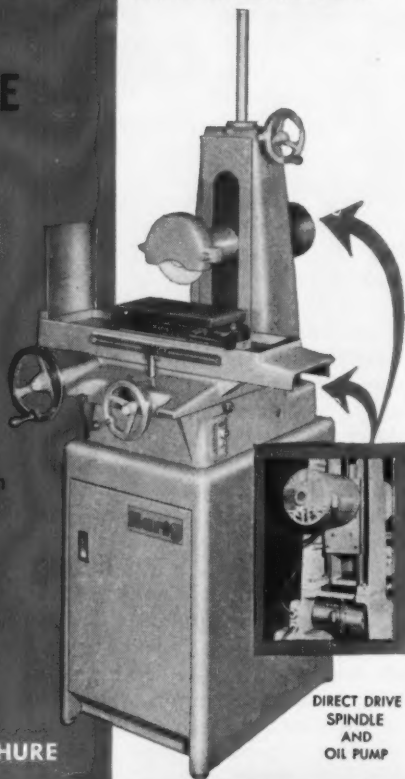
# Harig 612 SURFACE GRINDER

with  
**NEW...EXCLUSIVE  
AUTOMATIC  
FORCED  
LUBRICATION**

- Continuous flow, recirculating system
- Washes away damaging grinding dust
- Triples life of ways
- Preserves original accuracy
- Promotes easy table operation
- Reduces maintenance—*oils complete machine*

...and many other features included as standard equipment, all at a surprisingly low price!

**WRITE FOR HARIG 612 BROCHURE**



**DIRECT DRIVE  
SPINDLE  
AND  
OIL PUMP**

## **GRIND-ALL FIXTURE**

Easily grinds various shaped perforators to  $\pm .0001$  accuracy.



Also, attachment to convert Grind-All into precision *Radius Dresser*.



**Harig**  
*Manufacturing Corp.*

5765 W. HOWARD ST. • CHICAGO 48, ILL.

For more data circle 399 on Postpaid Card

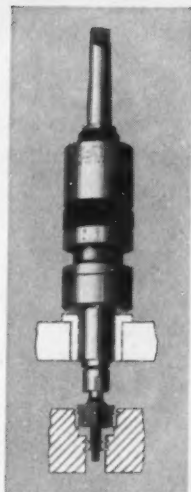
## QUICK-CHANGE FEATURE ENABLES BOKUMATIC RECESS TOOL HOLDERS TO WORK OFF FIXTURE...OFF PART

- ▶ Only recess tool holder available with quick-change adapter.
  - ▶ Holder convertible to off-center style for deeper recessing by changing to off-center type adapters.
  - ▶ Holder uses straight shank cutting tools, reducing cost of perishable tools.
  - ▶ Holder can be used either vertically or horizontally.
  - ▶ Holder convertible from jig fixture piloting to work piece piloting.
  - ▶ Holder actuated by two cam pins 180° apart for smooth chatter-free recessing.
  - ▶ Cam pins accessible for easy replacement.
  - ▶ Replaceable tool holder shanks are located by two pilots for positive concentricity.
  - ▶ Bokum standard recessing cutters with radial relief can be used.
  - ▶ Cutting tool can be preset in quick-change adapter as to depth into part before tool holder is assembled.
- Write today for catalog BO-1-60*

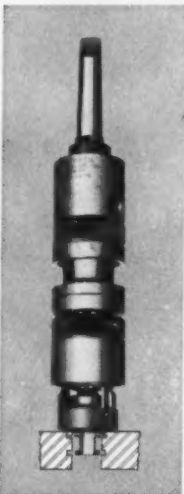
### BOKUM TOOL COMPANY, INC.



14775 WILDEMERE AVENUE  
DETROIT 38, MICHIGAN



Standard Model B holder with quick change adapter and pilot to fit in bushing plate assembly.



Standard Model B-1 holder and quick change adapter and pilot to work off part.

For more data circle 400 on Postpaid Card

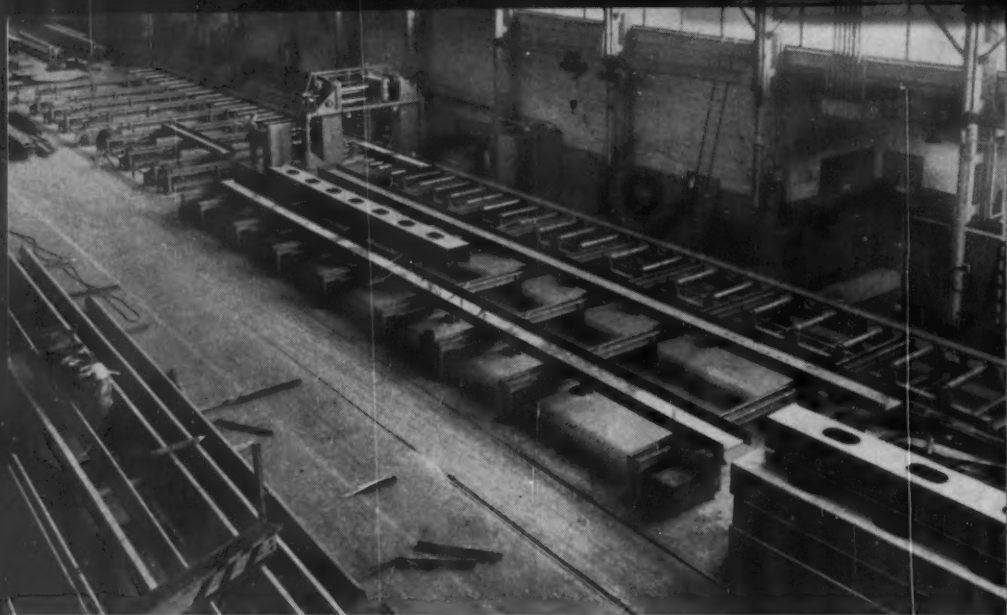


Fig. 1—Hill numerically controlled beam and column drilling machine at R. C. Mahon plant.

# **Numerically Controlled Machine Drills Holes in Structural Components**

***Cost drastically cut in fabricating steel structure for Ohio River bridge.***

**The numerically-controlled beam and column drilling machine shown in Fig. 1** is now in operation at the R. C. Mahon Structural Division, Detroit. Developed and built by Walter P. Hill, Inc., this machine is said to be cutting the cost

of producing holes in drilled patterns by more than 85 percent over former layout, spacer-punching, reaming and radial drilling methods. Hole patterns are produced to such accuracy by the numerical control process that reaming operations on the

assembly floor are claimed to be virtually eliminated.

At the Mahon plant, the machine is being used to drill holes in high strength steel columns, and beams for a new bridge being constructed to connect Louisville, Kentucky with Albany, Indiana.

Basically, the machine consists of a motorized run-in conveyor, a motorized beam feed roller conveyor, a motorized run-out conveyor and a high-speed drilling machine having two opposed single spindles and one vertical spindle. One operator controls the entire production unit. The machine can drill or gun-drill  $\frac{3}{4}$ -inch diameter holes in steel at feeds up to 30 inches per minute.

A General Electric Mark IV

numerical positioning control on the machine monitors the advance and clamping of the beam (A-motion) and the positioning and feeding of each of the drill spindles (X, Y and Z-motions). Auxiliary functions such as drill feed and retract are in an automatic machine cycle that is initiated by the tape.

In operation, the sections to be drilled are loaded on the run-in conveyor. By operating a push-button control, the operator can feed one beam at a time onto the beam feed conveyor. Then the beam is advanced hydraulically, clamped and drilled, as shown in Fig. 2, under tape control. When the drilling of the specified hole patterns in the beam is completed, the operator pushes

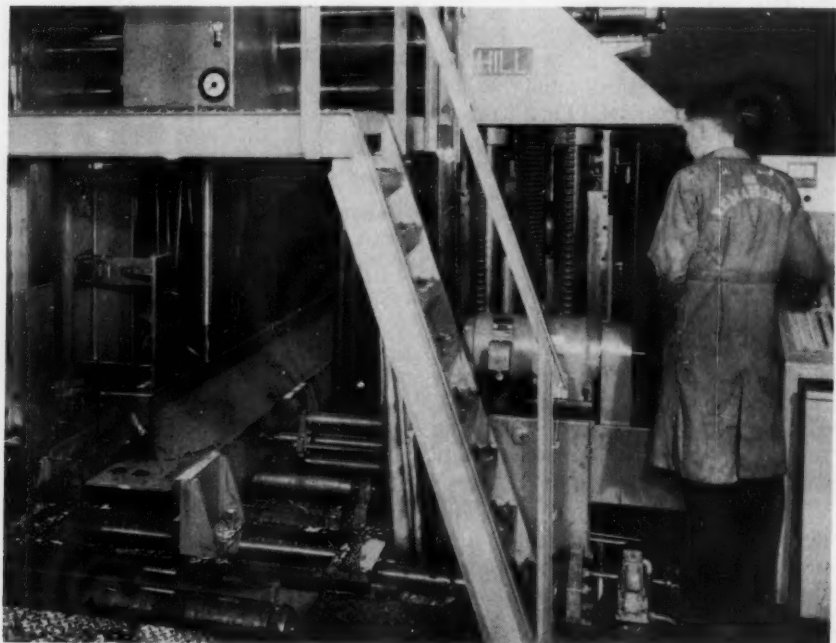


Fig. 2—Drilling a large bridge beam on the Hill machine at the R. C. Mahon Detroit plant.

**"... machine accommodates beams up to 300 feet long."**

another button that causes the beam to be discharged onto the run-out conveyor where several beams can be stored for pick-up by the factory overhead cranes and transferred to the assembly bays.

The Hill numerically-controlled beam and column drilling machine is made to accommodate columns and beams up to 300 feet long. The machine work section dimensions are normally 3 feet by 18 inches. The machine will handle a minimum 6-inch standard beam. It will accommodate beams and columns up to 80 feet long and has a work section of 4 feet by 4 feet. Holes up to 1½ inches in diameter can be drilled with the Hill machine.

Complete machine operating flexibility is provided by three operating methods: tape control, dial control and manual control. Dial control enables random holes not in the programmed tape to be accurately positioned and drilled in the number. Manual control permits the operator to jog the drill in forward or reverse directions outside of the automatic drill cycle. Floating zeros of up to 0.040 inch on all motions permit the establishment of new or different reference points to take care of structural member mill variations within commercial tolerances. Full floating zeros covering the entire range of each coordinate are optional.

Under tape control, pushing of the cycle start button causes the tape reader in the control console to read the first block of information on the tape. Such a block includes dimensions for all four machine motions (if required) as well as auxiliary

code information for each head that is to drill at that time. The machine immediately moves to the command locations with all motions moving simultaneously. When the A-motion is in position, the part clamps are actuated. Then, as soon as one of the drills moves to start a drill cycle, the next block of information on the tape is read and stored until all drill cycles are completed. The control panel is equipped with cycle stop, emergency stop and emergency return buttons so that the operator has complete control of the machine—independent of the tape programmed cycle.

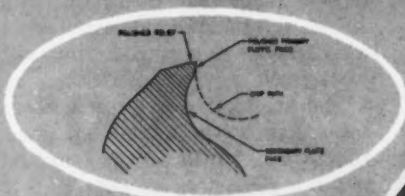




# WELDON *Ski-Kut* END MILLS

**FOR CUTTING ALUMINUM**

PATENT APPLIED FOR



## CUTTING ALUMINUM MADE EASIER, SMOOTHER AND FASTER

The primary flute face of the Ski-Kut End Mills, being narrow, definitely minimizes adherence of chips to the flute faces. Such adherence or welding of aluminum chips contributes in a major degree to the difficulty in milling aluminum.

Greater feeds, longer tool life, better finish, easier operation of equipment are some of the advantages to be gained by the use of Weldon Ski-Kut End Mills for cutting aluminum.

Weldon SKI-KUT End Mills are available from stock in size from 1/4" to 3" in various lengths. For full information write for folder SKM-1

**A RADICALLY NEW DEVELOPMENT  
IN END MILL DESIGN FOR CUTTING  
ALUMINUM THAT SPEEDS PRODUCTION  
AND REDUCES COST.**



Catalog list numbers are now marked on all Weldon tools and holders as an aid when reordering . . . another WELDON FIRST.

Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.

# THE WELDON TOOL COMPANY



3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

For more data circle 401 on Postpaid Card

1. Minimizes adherence of Chips to Flute Faces
2. Increased Shearing Action (45° Helix Angle)
3. Hammering Effect Practically Eliminated
4. Greater Feeds
5. Longer Tool Life
6. Better Finish
7. Easier Operation

# »» MORE

## PRODUCTION

### Machining Large Gear Blanks Automatically

**Pushing the limits of both tooling and machine**, rough forged gear blanks and other parts for big steel mill production equipment are machined automatically on a single spindle chucker at United Engineering & Foundry Company, Youngstown, Ohio. Pieces are so large that they often require the full swing capacity of the machine. Heavy cuts up to 1-inch depth pull the drive motor's full 40 horsepower—even

involve temporary overloads. Nonetheless, United Engineering consistently holds accuracy limits within 0.001 inch.

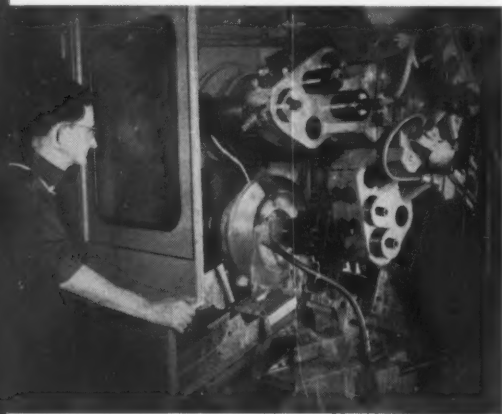
The machine, a Warner & Swasey 3-AC, has boosted small lot production to 4 to 1 over former hand lathe methods. Lot sizes average 20 to 100 pieces. Similar workpieces, such as mitre gears, frequently are grouped, according to the company, to achieve the added unit cost savings afforded by 100-piece or larger runs.

For more data circle 1 on Postpaid Card

★ modern machine shop ★

### Tracing Simplifies 12-Foot Diameter Machining Jobs

**The machining of contoured parts up to 12 feet in diameter** has been made a relatively simple operation at the Kinco Inc. plant in Montebello, California. Handling this work is a Niles-Bement-Pond 144-inch vertical boring mill with a Mimik 3000 series hydraulic tracer which is capable of turning all types of spherical radii and irregular contours. The tracer is interchangeable when needed with a 100-inch mill in the Kinco plant. This Mimik tracer, made by Allied Pacific Manufacturing Co., Los Angeles, under license



Parts for big steel production equipment are machined automatically on this single spindle chucker at United Engineering & Foundry.

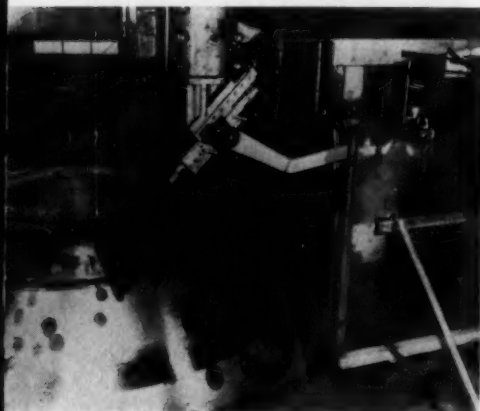
# MODERNIZATION THROUGH

from Mimik Tracers, Inc., Buffalo, N. Y., is actuated by a highly sensitive 6-ounce pressure stylus and hydraulic valve which follows the template. The Mimik's tracing stroke is eight inches. There is no limit to the workpiece size since the stroke is increased indefinitely, without interruption, by engaging the machine feed which is set along the mean path of the contour, the tracer absorbing the contour itself. Kinco officials say that they are able to hold exacting tolerances and finishes on large contoured surfaces by this method.

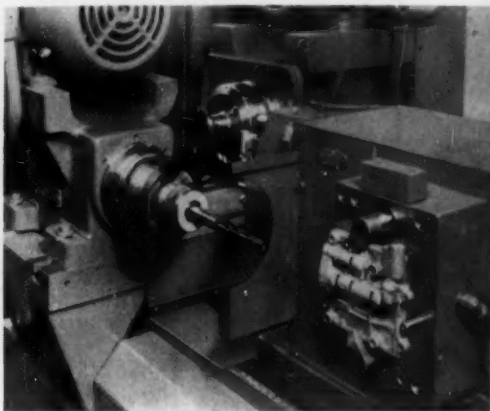
For more data circle 2 on Postpaid Card

## Combination Fly Cutting and Bore-Reaming Setup Produces Automotive Part

The single-end precision boring machine shown herewith, recently built by Ex-Cell-O Corporation of Detroit, Michigan, fly cuts a joint face and step bore-reams an aluminum die-cast automotive transmission part in one operation. The automatic cycle includes a rapid table movement to the left. Here the transversely mounted rear spindle performs a fly cutting operation while



Mimik hydraulic tracer, attached to a 144-inch vertical boring mill, machines a 98-inch diameter spin chuck at plant of Kinco Inc.



Special fixture and spindle arrangement allows for the performance of bore-reaming and fly cutting operations during same cycle.



## New \$300 precision cut-off saw paid for itself in 15 minutes

Navkut\*, the new precision cut-off saw, cut production costs of "spacers" substantially at Unicorn Engineering Inc. (now owned by Computer Measurements Co., Sylmar, Calif.) The cost of spacers was reduced from \$8 to 80c each by Navkut's simple cut-off operation. During every 15-minute production run, the Navkut saw paid for itself. Such results aren't unusual with Navkut, the saw that can cut parallel tolerances to within .002" in ferrous, non-ferrous, wood, and plastic materials with only two types of blades. Usually the cut finish and accuracy will be so precise there is no need for milling or grinding. All this, yet the Navkut saw costs only \$300. See for yourself how it can save you money. Write today for a free 15-minute demonstration in your shop.

\*TRADEMARK

Navkut saw is another product marketed by:



### NAVAN PRODUCTS INC.

Subsidiary of  
North American Aviation, Inc.  
900/1 North Sepulveda  
El Segundo, California

## more production . . .

step-reaming is accomplished at the front station. At the end of the cycle, the partially finished component clamped in the rear station is reloaded at the front and another part, semi-finished at a previous operation, is loaded at the rear position. Gross production is nearly 150 parts per hour.

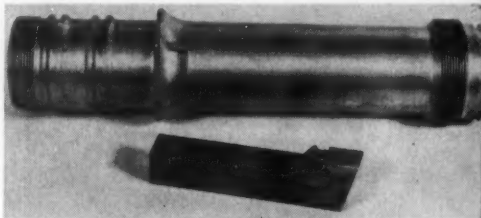
Standard Ex-Cell-O precision spindles equipped with carbide-tipped cutting tools perform these precision finishing operations. The five bore diameters are held consistently concentric within 0.0005 inch T.I.R. while holding an excellent surface finish.

For more data circle 3 on Postpaid Card

★ modern machine shop ★

## Carbide Cutting Tools Used to Machine Steering Cylinders

Tough tungsten carbide cutting tools help build the "muscle" needed to control a jet airliner as it moves across a runway before take-off or after landing. The muscle—hydraulic



Shown here is one of the steering cylinders used to control jet airliners on take-off and landing. Cylinder is made by Menasco Manufacturing Company, using Carmet's 606 tungsten carbide cutting tool shown in foreground.

For more data circle 402 on Postpaid Card

pressure—is developed in steering cylinders which Menasco Manufacturing Company, Burbank, Calif., produces for Boeing Airplane Company. Boeing used the cylinders on its propeller-driven planes and is using them now on its 707 jet airliners.

The cylinders' hydraulic pressure depends on close tolerance machine work. Menasco is getting the job done with Carmet 606 tungsten carbide—a product of the Carmet Division of Allegheny Ludlum Steel Corporation. Menasco, one of the nation's leading producers of aircraft landing gear, noted that Carmet 606 gives a 25 percent increase to the life of the cutting tool used to machine steering cylinders.

An airliner is equipped with two steering cylinders to control the nose gear steering—a vital part of the plane, especially during taxiing. The cylinders are controlled by a steering wheel located in the cockpit of the plane. The wheel operates a metering valve which

directs hydraulic fluid to the cylinders. The hydraulic pressure moves the cylinder pistons.

Piston arms—connected to steering knuckles on each side of the strut—work like a pair of human hands, one pushing while the other is pulling to turn the nose gear in the desired direction. This arrangement keeps the airliner under complete control before take-off and after landing.



**ONE DRILL PRESS  
TAKES THE PLACE  
OF 4 OR 5 WHEN  
YOU USE...**

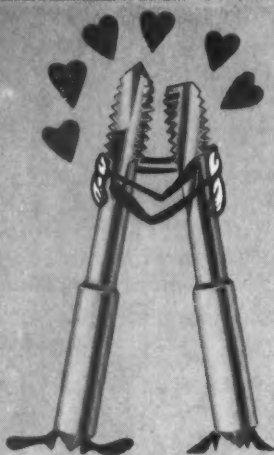
## **QUADRILL** 4 & 5 SPINDLE **TURRET DRILLING HEADS**

DRILL, REAM, TAP, COUNTER-  
BORE AND COUNTERSINK ON A  
COMMON TOOL AXIS.

**Convert your standard drill presses into precision turret drilling machines—save on floor space, capital equipment costs (up to 350%) . . . up to 70% IN DIRECT LABOR COSTS over in-line, single gang drill setups. Easy to install. Ideal for both long and short runs . . . fast setups . . . simple tooling.**

**WRITE TODAY FOR BROCHURE**  
**CHICAGO QUADRILL**  
*Company*

**1854 BUSSE HIGHWAY DES PLAINES, ILLINOIS**  
**For more data circle 403 on Postpaid Card**



**THE INSIDE STORY  
BEHIND THE  
"NECKING"  
OF THE NEW**

**Jarvis  
STUBBY**

**NEW STUB SCREW MACHINE  
TAPS FOR  
BAR AUTOMATICS SAVE TIME,  
ELIMINATE ALTERATIONS!  
HIGH SPEED STEEL  
GROUND THREADS**

**OTHER JARVIS TAPS AVAILABLE**

- HAND TAPS • PIPE TAPS
- TAPPER TAPS • NUT TAPS
- MACHINE SCREW TAPS
- PULLEY TAPS
- ALL TYPES OF SPECIALS

**WHY STUBBY?**

Jarvis Stubby, a new screw machine stub tap developed for production tapping on bar automatics, is designed to cut costs by eliminating down time and improving performance.

**SECRET OF STUBBY'S "NECKING"**

The area directly behind Stubby's threads has been necked down to below the root diameter. This "necking" creates more chip room . . . reduces drag . . . facilitates application of cutting oils or coolants to the cutting edges for longer tap life.

**STUBBY IS STRONGER**

Its short threaded section and shorter overall length make Stubby a much stronger tap. You use standard size bushings (eliminating the need for special drills when making tap holders), because Stubby's shank is ground to standard fractional dimensions. Depth of thread is not a problem; for the combination of length of thread and length of necked shank is equal to the thread length on equivalent standard taps.

**STUBBY BEATS COSTS —  
CUTS DOWN TIME**

With Stubby you no longer need to alter standard taps for short clearance jobs. This means you cut costly machine down time, operator's time and minimize the possibility of having inconsistent tap performance.

**STUBBY AVAILABLE FROM STOCK!**

Stubby is available from stock in Spiral Flute Bottoming #SF-01, Spiral Point Plug #SP-50, and Bottoming Spiral Point #SP-70. All 3 styles available in machine screw sizes #2 thru #10. Other sizes available on request. WRITE FOR STUBBY LITERATURE AND TAP CATALOG.



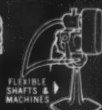
MULTIPLE  
SPINDLE  
DRILLING  
& TAPPING  
HEADS



TAPPING  
MATIC



HSS &  
CARBIDE  
TOOLS



FLEXIBLE  
SHAFTS &  
MACHINES



LEAD  
SCREW  
TAPPING  
HEADS



**JARVIS CORPORATION**  
101 Washington Park  
North Attleboro, Mass.

For more data circle 404 on Postpaid Card



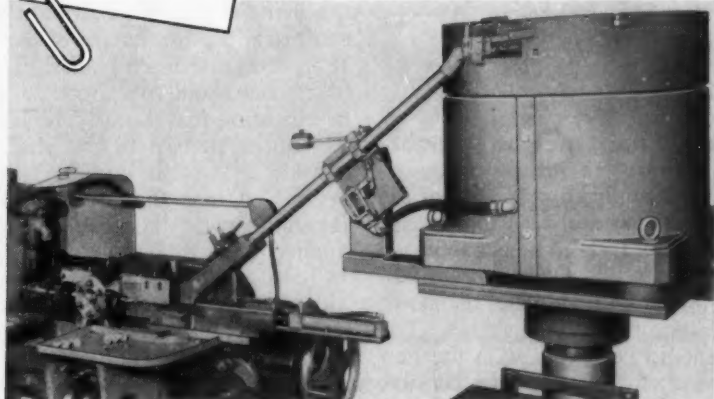
**SYNTRON**

# CASE HISTORY

*another successful application in the*

No. 3540

## MACHINERY MANUFACTURING INDUSTRY



**SKINNER ELECTRIC VALVE DIVISION, New Britain, Conn.**  
**increases second operation work as much as 30%**  
**with SYNTRON PARTS FEEDERS**

A recent improvement developed by Brown & Sharpe Company, Providence, Rhode Island, is the automated loading of automatic screw machines. This improved method which drastically improves loading efficiency utilizes Syntron vibratory bowl-type Parts Feeders which automatically supply parts in an oriented single-line, rate-controlled feed through a Brown & Sharpe designed automatic turret loading arrangement to a Skinner Power chuck. Skinner Electric Valve Division management says, "The Syntron Parts Feeder is very versatile and will accommodate parts of different size through the same Feeder. It is also trouble-free." With regard to their performance, Skinner Electric Valve offers, "Installations of this equipment in the field have increased the efficiency on second operation work as much as 30%."

For your parts handling application, why not investigate the possibilities of Syntron electromagnetic vibratory bowl-type Parts Feeders.

Write for a Syntron catalog section on Parts Feeders  
and the name of the representative near you.



**SYNTRON**

**SYNTRON COMPANY**

309 LEXINGTON AVE., HOMER CITY, PA.

For more data circle 405 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 145

# Ideas from readers

Several time-saving ideas and suggestions for the man in the machine shop.

## How to Straighten a Bowed Shaft

By L. KASPER

**A bowed shaft may be straightened, without springing or peening,** by the application of heat at the proper points and in the proper manner. The shaft should be supported on two narrow edges so that there will be an opening underneath, as shown in the accompanying sketch. The shaft should be placed with the bow downward; that is, with the concave side upward.

With an acetylene torch or natural gas burner, adjusted to a soft flame,

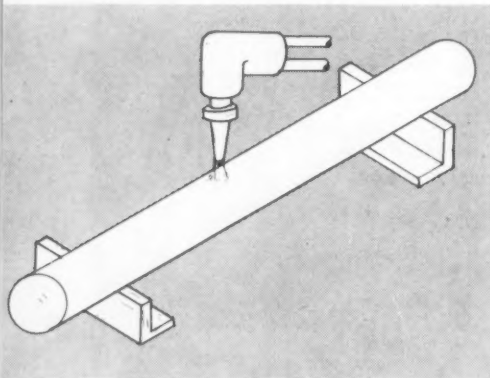
the flame is played axially along the shaft over the full length of the bow. If an acetylene torch is used, the primary cone should not touch the shaft, or blistering may occur. The heat on the upper surface of the shaft will cause it to expand, and the bow will reverse so that the upper side will become convex. The heat should be applied until the upper side appears to have about the same bow as previously but in the reverse direction. The shaft is then allowed to cool naturally to atmospheric temperature. If the bow had been severe, examination will show that some of it will still remain, but to a lesser degree. Repeating the process will gradually reduce the amount of bow. If there is a short kink in the shaft, it should be supported close to the kink and heat concentrated at the center of the kink. With care, shaft may be brought back to perfect straightness.

★ modern machine shop ★

## Paired Grinding Wheels Solve Breakdown Problem

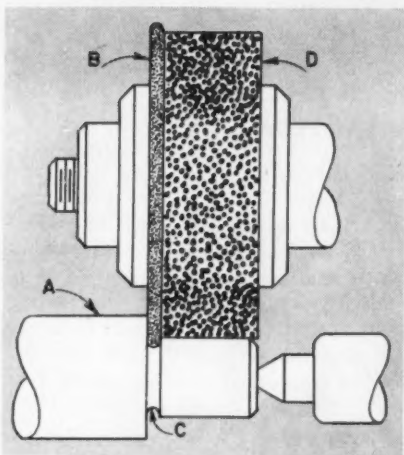
By H. J. GERBER

**Our shop had the job of plunge grinding** a short, shouldered length on a hardened plunger, as indicated at A in the accompanying sketch. It



Method for straightening a bowed shaft.

was desired to simultaneously produce an accurate diameter on the bearing surface and finish a relief groove adjacent to the shoulder. The use of a single wheel, dressed to the required outline, proved to be impractical because the thin flange, intended to finish the groove, broke down prematurely on this vitrified wheel. Solution of the problem involved the use of two wheels held tightly against each other on the spindle, as shown in the sketch. A thin, shellac bonded wheel, B, was used to form the groove, C, and was held against the thicker wheel, D, by an oversize collar to prevent flexing. Truing was accomplished by temporarily removing the thin wheel to permit diamond traverse across the wide one. Because of the greater hardness of the thin wheel it required dressing only one-fourth as often.



Sketch showing method for simultaneously grinding bearing surface and relief groove on a hardened plunger using two wheels.

Index marks on both wheels enabled accurate replacement of thin one.

## NEW...BENCH NUMBERING PRESS MODEL 136

This new small, light, compact Press was designed for stamping small Name Plates and small flat articles with up to  $\frac{1}{8}$ " high characters.

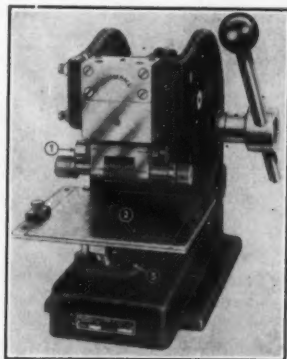
It weighs only 65 lbs. yet has the power and strength of a press much larger in size.

Its compactness and small size, combined with its power, should be very welcome where saving of valuable space and leaving larger power presses free for other work is of importance.

The model 136 is hand operated, using a cam to obtain pressure. The fact that this press has only three moving parts makes it extremely easy to maintain.

Any Numbering Machine, automatic or non-automatic, Typeholders with interchangeable Steel Type, or Special Dies can be operated in this Press.

We also make numbering machines and type.



Write for bulletin MS-136.

**NUMBERALL STAMP & TOOL CO.**  
HUGUENOT PARK STATEN ISLAND 12, N. Y.

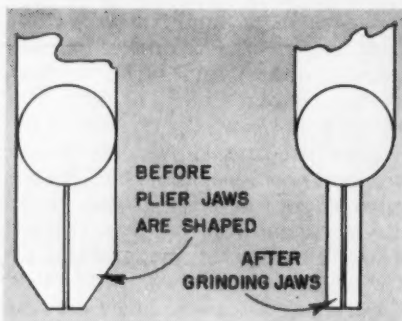
For more data circle 406 on Postpaid Card

ideas from readers . . .

## New Tool Made from Worn Pliers

By ROBERT HILL

A pair of pliers used for electrical work in our shop had become worn and somewhat battered; however, it was still in working order. After purchasing a new pair of pliers, we did not discard the old pair but rather converted it into another type of pliers. As shown in the accompanying sketch, we ground both of the jaws back 3/16 inch away from the pivot screw to a suitable diameter. The needle jaws thus produced will allow for the clamping of tiny workpieces that cannot be held satis-



Sketch showing how worn pliers can be made into a useful tool for variety of jobs.

factorily with regular shop pliers. Moreover, the small jaws are useful for making small arcs or loops in wire and for readily retrieving pieces that fall into blind holes or cracks measuring 1 inch deep or less.

# .000,020"

(TWENTY MILLIONTHS)

GUARANTEED ACCURACY

## VEE-ARC

SUPER-PRECISION

### LIVE CENTERS



Specifically  
designed  
for  
**ULTRA-  
PRECISION  
TURNING AND  
GRINDING OPERATIONS**

#### UNIQUE FEATURES

- Extended nose spindle . . . carbide tipped
- Life-time lubricated, pre-loaded ABEC-7 ball bearings
- Spring compensation to .020" axial movement without impairing accuracy
- Heat treated, stainless steel construction
- Hexagonal anti-roll shoulder

Vee-Arc Super-Precision Live Centers are also  
**AVAILABLE THROUGH YOUR  
MONARCH AND CINCINNATI  
LATHE DISTRIBUTORS**

WRITE FOR BULLETIN 1282A DIRECT TO  
**VEE-ARC CORPORATION, DEPT. MM, WESTBORO, MASS., U.S.A.**

For more data circle 407 on Postpaid Card



*Machining beryllium with the MIMIK 9000 Tracer at  
The Beryllium Corporation's Hazelton, Pa., plant.*

## MIMIK® GIVES THE ANSWER

The question facing The Beryllium Corporation was how to speed production, cut high tooling costs and maintain close tolerance and finish in handling fast rising orders for hard-to-machine beryllium components. After a thorough study, aided by Mimik engineers, a decision was made to use Mimik Hydraulic Tracers on existing machine tools.

The Mimik Tracer, because of its extreme accuracy, versatility and complete interchangeability, gave The Beryllium Corporation added production capacity at a fraction of the capital cost required to install new machinery.

Changing production demands are met easily with the Mimik Tracer. The complete unit can be transferred in a matter of minutes from machine to machine regardless of make. The hydraulic slide action and super-sensitive 360° stylus control ensures that fine tolerances are consistently achieved.

*Call or write for more information on the Mimik Tracer for engine and turret lathes, V.T.L.'s and milling machines. Request details of Mimik's unique guarantee of time and performance related to a specific job and machine.*

# MIMIK® TRACERS™



**MIMIK TRACERS INC., Buffalo, N.Y.**

**EAST:** Mimik Tracers Inc., 3901 Union Rd., Buffalo, N.Y.

**CENTRAL:** Bartsch Tool Corp., 3714 Oakton St., Skokie, Ill.

**WEST COAST:** Allied Pacific Manufacturing Co., Compton, Cal.

**CANADA:** Retor Developments Ltd., Galt, Ontario

*Mimik-men are everywhere*

For more data circle 408 on Postpaid Card



**Use Postpaid Cards opposite Page 32 and Inside Back Cover for requesting free copies of literature listed below.**

#### **Miniature Tools**

Woodruff and Stokes Co., Inc., Building 32, 349 Lincoln St., Hingham, Mass. Catalog entitled "Small Precision Cutting Tools" contains complete information and illustrations concerning miniature center drills, end mills, hexagon broaches, spline broaches, recessing and back chamfering tools designed for screw machines.

**For more data circle 5 on Postpaid Card**

#### **Valves**

American Chain and Cable Co., Inc., R-P and C Valve Division, Reading, Pa. Bulletin DH-38 describes the Fig. BL-300 Forged Naval Bronze Ball Valve with "auto-mating" seats.

**For more data circle 6 on Postpaid Card**

#### **Miniature D. C. Motors**

Barber-Colman Co., Electrical Components Division, 114 Loomis St., Rockford, Ill. Flyer F-10309 presents HYQM Miniature D. C. Motors, which are ideal where space is limited.

**For more data circle 7 on Postpaid Card**

#### **Turret Lathe**

Gisholt Machine Co., Madison 10, Wis. This color flyer concerns the Gisholt 3L Saddle Type Turret Lathe. The machine is illustrated and described, specifications are provided and a diagram showing tool layout is given.

**For more data circle 8 on Postpaid Card**

#### **Press Brake Gage**

Addresso Manufacturing Co., 9105 West King St., Franklin Park, Ill. Information on the Model 800 Press Brake Gage, which incorporates many features for safer and faster setup and production.

**For more data circle 9 on Postpaid Card**

#### **Turret Lathes**

Bardons and Oliver, Inc., 1133 West Ninth St., Cleveland 13, Ohio. Brochure describes the complete line of Bardons and Oliver machine tools. This includes five completely different ram type and saddle type turret lathes, offering collet capacities from 1 to 5 inches. Also shown is the complete line of cutting off lathes, ten different sizes offering collet capacities from 2 to 16 inches. The brochure also lists complete machine specs for both turret lathes and cutting off lathes.

**For more data circle 10 on Postpaid Card**

#### **Machine Shop Accessories**

Brown and Sharpe Manufacturing Co., Industrial Products Division, Providence 1, R. I. Catalog Number 37A, Second Edition, contains 48 pages of complete data on such products as arbors, adapters, collets, ground flat stock, index plates, lathe centers, permanent magnet chucks, precision ground tool steel, spring chucks, spring collets, taper mandrels and expansion bushings, low carbon ground flat stock, vises and work driving dogs.

**For more data circle 11 on Postpaid Card**





# LITERATURE

## Cutting Tools

National Twist Drill and Tool Co., Rochester, Mich. This attractive brochure is entitled "Tools versus Tools Plus." Shown are some of the "whys" and "hows" that go into the design and manufacture of National's broad line of quality metal cutting tools.

For more data circle 12 on Postpaid Card

## Pipe and Tubing Fabrication

Vogel Tool and Die Corp., 1823 North 32nd Ave., Stone Park, Ill. Flyer tells that significant savings in cost and time are offered by Vogel pipe and tubing fabrication—operations include notching, shaping, cutting and bending of pipe and tubing from  $\frac{1}{8}$  to 3 inches o.d. and larger.

For more data circle 13 on Postpaid Card

## Band Saws

Wells Manufacturing Corp., 808 Tyler St., Three Rivers, Mich. Flyer presents the Wells Model 300 Metal Cutting Band Sawing Machines. This machine can be used for horizontal cut-off work or as an upright band saw.

For more data circle 14 on Postpaid Card

## Fittings and Flanges

Babcock and Wilcox Co., Tubular Products Division, Beaver Falls, Pa. Engineers, buyers and estimators associated with piping will be interested in this seamless welding fittings and flanges brochure. This eight page Booklet FB-502A covers seamless welding fittings and flanges in carbon, alloy and stainless steels.

For more data circle 15 on Postpaid Card

## Automatic Form Grinders

Jones and Lamson Machine Co., 521 Clinton St., Springfield, Vt. Literature on the latest models of J&L Automatic Form Grinders. Machines feature Perpetual Form Control for wheel truing. Model E-2 uses the standard J&L truing devices with PFC.

For more data circle 16 on Postpaid Card

## Blueprint and Toolholder

Kelm Manufacturing Co., Route No. 2, Coloma, Mich. This new flyer presents the Kelm Machine Caddy—a blueprint and toolholder for all machine tools. It was designed for more efficient utilization of man-hours in all shops.

For more data circle 17 on Postpaid Card

## Drum and Barrel Cradles

Lexco Engineering and Manufacturing Corp., 25 West Chestnut St., Souderton, Pa. Flyer on Lexco Drum and Barrel Cradles, which have a new and improved rugged design. They can handle heavy drums or barrels with safety.

For more data circle 18 on Postpaid Card

## Diamond Tools

National Diamond Laboratory, Inc., 619 South St., Peekskill, N. Y. New diamond tool catalog on specialty products relating to industrial diamond tools. This encompasses rat-tail or 180 degree radius dressers, small diamond grinding quills for use in high speed internal grinders or jig boring equipment and sieve size specs on diamond lapping compound, which is also color coated. A complete decimal chart with tables is provided on the back of the catalog.

For more data circle 19 on Postpaid Card

## free literature . . .

### Carbides

Chromalloy Corp., Sintercast Division, 169 Western Highway, West Nyack, N. Y. 12 page manual on Ferro-Tic machinable steel-bonded carbides. It is divided into four general sections: description of Ferro-Tic C, typical tooling problems solved with this material, complete machining and heat treating instructions and a listing of physical properties and stock sizes available.

For more data circle 20 on Postpaid Card

### Hold-Down Clamps

Adjustable Clamp Co., 436 North Ashland, Chicago 22, Ill. Flyer on the "Jorgensen" Hold-Down Clamps, which are easy to install. They mount securely on surface of any bench, sawhorse, machine or welding table. They slide on or off holding-bolt in seconds and hold work firmly.

For more data circle 21 on Postpaid Card

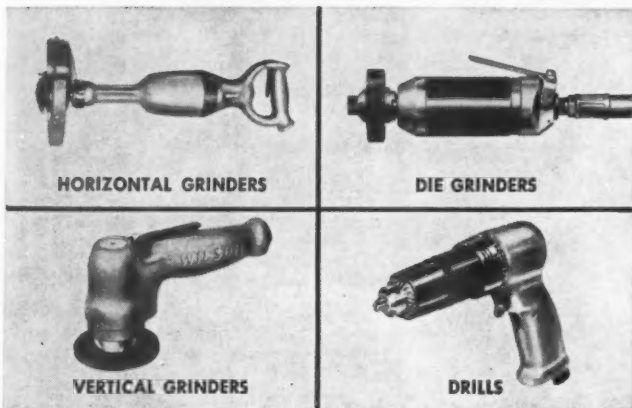
### Upright Drilling Machine

Giddings and Lewis Machine Tool Co., Fond du Lac, Wis. A new 10 h.p. Bickford 30 inch up-

right drilling machine with a radial drill type head is described in Bulletin BU-30. The bulletin presents and discusses such features as head design, automatic electric tapping reverse, self-adjusting magnetic clutch and so on.

For more data circle 22 on Postpaid Card

# WILSON PORTABLE PNEUMATIC TOOLS



HORIZONTAL GRINDERS

DIE GRINDERS

VERTICAL GRINDERS

DRILLS

### Vises

Harig Manufacturing Corp., 5765 Howard St., Chicago 48, Illinois. "Rapidset" instant action, all purpose toolroom vise and "Jawset," an adjustable pressure vise specially designed for long and short production runs, are both fully described in this colorful new literature.

For more data circle 23 on Postpaid Card

### Milling Machines

J. A. Fay and Egan Co., Greaves Machine Tool Division, 2700 Eastern Ave., Cincinnati 2, Ohio. This is a fold-out brochure on the Greaves No. 2-H Plain and Universal Millers.

For more data circle 24 on Postpaid Card

## Lightweight • Powerful • Compact

All Wilson portable pneumatic production tools are designed for easy handling. These lightweight, compact tools are production time savers on a wide range of work. Catalog PT-58 gives all the facts. Write for your copy.

TW906

**THOMAS C. WILSON, INC.**

21-11 44th Avenue, Long Island City 1, New York

**BETTER TOOLS FOR BETTER WORK**

For more data circle 409 on Postpaid Card

## HOW TO EXPAND THE USE OF YOUR PRESS BRAKES



the  
blue book  
of  
press brake  
tooling

This new book is the most comprehensive treatise on press brake work—134 pages of ideas. It is offered to assist press brake users visualize methods suitable to their own bending and forming needs.

To develop any of these ideas to your particular type of work, on any make of press brake, the Tooling Division at Dreis & Krump offers you top, experienced designers and a large die shop well equipped to make the finest press brake dies of any type, any size, at lowest cost.

This book, *Press Brake Dies*, is available to any press brake user by request on company letterhead.

0797

A Tradition of Quality and Value since 1899

Press Brakes • Press Brake Dies  
Hand and Power Bending Brakes  
Special Metal-Forming Machines



**DREIS & KRUMP**  
MANUFACTURING CO.

7418 S. Loomis Blvd., Chicago 36, Illinois

For more data circle 410 on Postpaid Card

## HAMILTON SUPER SENSITIVE

### Tapping MACHINE

2991 b



Capacity  
000-120 to 10-24

Spindle does not rotate between duty cycles but starts cutting rotation softly and slowly as pressure is applied to the feed lever. Further, rotation stops instantly and automatically when pressure on the feed lever is released; and reverses when pressure is reversed.

As a result of this unique feature, blind holes now can be tapped to the very bottom without risk of tap breakage, thin materials can be precision tapped without stripping, brittle materials can be tapped without chipping.

YOUR JOBS can be tapped better, faster, and with more precision on a HAMILTON machine.

In requesting **COMPLETE INFORMATION** ask for free Bulletin No. 2991.

**THE HAMILTON TOOL  
COMPANY**

**828 SOUTH NINTH STREET  
HAMILTON, OHIO**

For more data circle 411 on Postpaid Card

154 MODERN MACHINE SHOP

## free literature . . .

### Air and Electric Tools

Albertson and Co., Inc., Sioux City, Iowa. Literature on the company's line of air impact wrenches, electric impact wrenches and numerous other air and electric tools.

For more data circle 25 on Postpaid Card

### Grinders and Lapping Machines

Norton Co., Machine Tool Division, Worcester 8, Mass. Form Nos. 349 and 351 concern Norton Grinding and Lapping Machines, equipped with the highly efficient Norton Radial and Face Truing Device.

For more data circle 26 on Postpaid Card

### Punching and Notching Equipment

Punch Products Corp., 382 Babcock St., Buffalo 6, N. Y. Ten page "Story of Unipunch Hole Punching and Notching Equipment" fully illustrates and describes the cost saving and production economies of Unipunch Unitized Tooling in presses and press brakes.

For more data circle 27 on Postpaid Card

### Single Spindle Automatic

The Cleveland Automatic Machine Co., 4940 Beech St., Cincinnati 12, Ohio. Four page bulletin describes the new design of 2½ inch Model "AW" Single Spindle Automatic. This bar automatic has variable forward and return turret feeds, controlled through an improved, simplified mechanical drive.

For more data circle 28 on Postpaid Card

### Millers and Accessories

The F. Hohlfelder Co., Barker Engineering Company Division, 26470 Lakeland Boulevard, Cleveland 32, Ohio. Circular effectively illustrates and describes Barker milling machines and accessories. Millers include horizontal and dual head models.

For more data circle 29 on Postpaid Card

### Roughness Meter

Cleveland Instrument Co., 6220 East Schaaf Road, Cleveland 31, Ohio. Flyer covers a roughness meter for accurate surface finish measurements and accessories for same.

For more data circle 30 on Postpaid Card

March, 1961

# HAMILTON *Tapping* MACHINE

SUPER SENSITIVE

2991 e

Capacity — 000-120 to 10-24

It's a



**HAMILTON  
TOOL**

use it with confidence!

*"The" Tapper*

In the field of small hole, precision tapping the HAMILTON Super Sensitive Tapping MACHINE stands alone. It is smooth, silent, precise, and sturdy.

Spindle returns to neutral position and stops rotation instantly and automatically when pressure on the feed lever is released.

**See ad on opposite page to learn what this means to you!**

## THE HAMILTON TOOL COMPANY

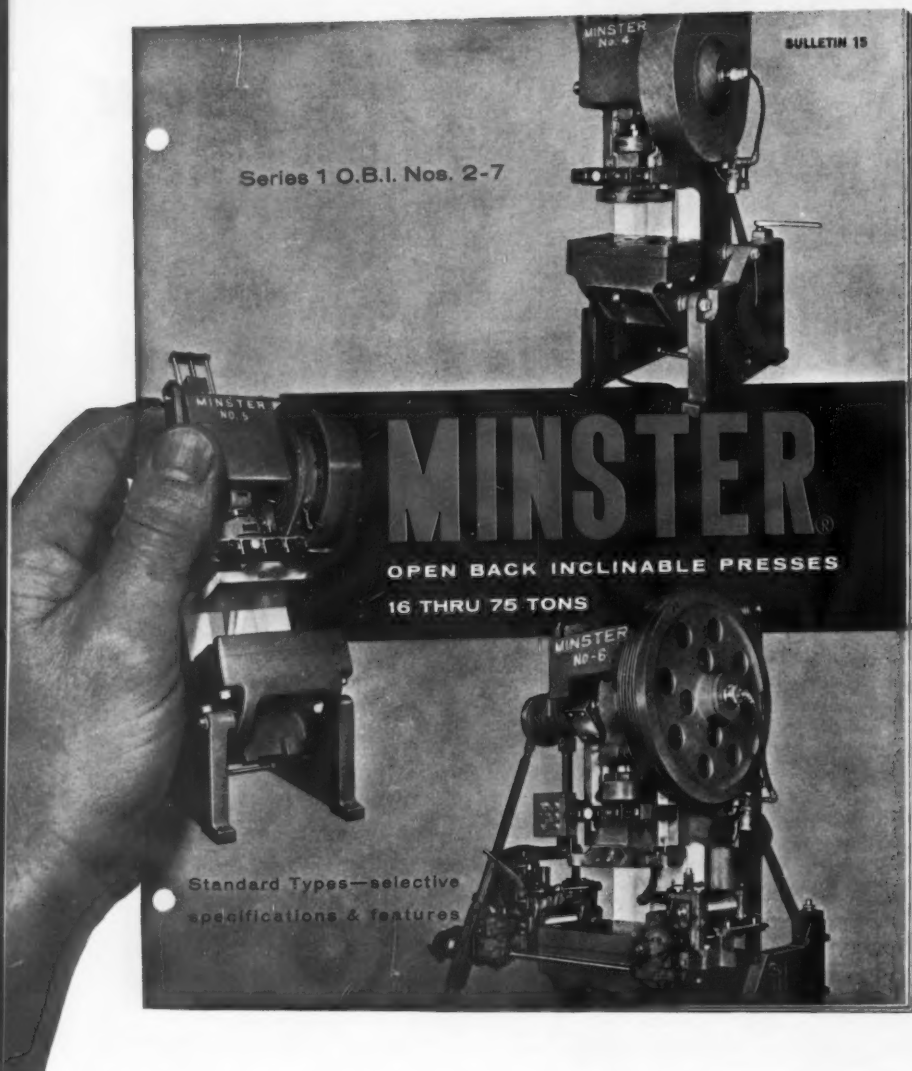
828 SOUTH NINTH STREET

HAMILTON, OHIO

For more data circle 411 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 155



MINSTER  
No. 4

BULLETIN 15

Series 1 O.B.I. Nos. 2-7

MINSTER  
No. 5

**MINSTER**

OPEN BACK INCLINABLE PRESSES  
16 THRU 75 TONS

MINSTER  
No. 6

Standard Types—selective  
specifications & features

The "Hidden Strengths and Values" of Minster O.B.I. presses... points of superiority that only Minster offers the O.B.I. user... are outlined in this new Bulletin 15. It will help you make comparisons when next you buy an O.B.I. May we send you a copy? Write or call...

The Minster Machine Company, Minster, Ohio

For more data circle 412 on Postpaid Card



**free literature . . .**

**Machine Shop Heaters**

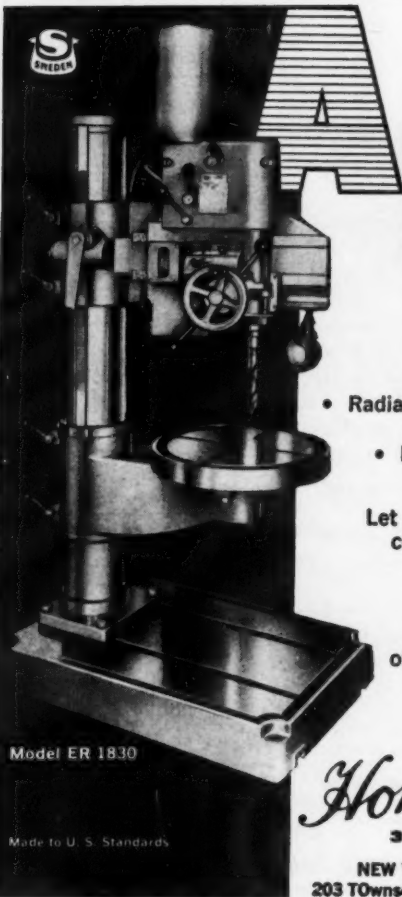
Fostoria Corp., Fostoria, Ohio. A new line of electric infrared comfort heaters for direct radiant heating of machine, tool and production shops without costly heating of the intervening air, is described in this eight page, two color Bulletin CH-100. Principles, advantages and typical applications of electric infrared comfort heating are discussed in this brochure.

For more data circle 31 on Postpaid Card

**Diamonds**

Wheel Trueing Co., 3200 West Davison Ave., Detroit 38, Mich. Booklet is recommended reading for the tool and manufacturing services engineer, beneficial and informative to the engineering student and worthwhile for anyone concerned with industrial production, mining, drilling or construction equipment or processes. Between the covers of this booklet are combined the realism of industry's dependence on diamond tools and the episodes of romance, adventure, intrigue and mystery surrounding diamonds.

For more data circle 32 on Postpaid Card



Model ER 1830

Made to U. S. Standards

only

## ARBOGA RADIAL DRILL PRESSES

### have the exclusive Drill Ejector

Shown here is just one model of the complete Arboga line.

- Radial Drill: 24½" • Capacity in steel: 1½"
- 8 speeds, 80-890 r.p.m. • Feeds: 2
- Exclusive Drill Ejector; 7½" dia. Column

### Seeing is believing!

Let any one of the 100 dealers across the country show and demonstrate for you this and other Arboga drill presses.

Over 100,000 are in use now, many completing a quarter of a century of trouble free service. Call any one of the numbers below or ask us for the name of your nearest Arboga dealer.

Illustrated brochure on request.

U. S. DISTRIBUTORS:

*Homestrand*

**MACHINE TOOL CORP.**

392 West Putnam Avenue, Greenwich, Conn.

NEW YORK  
203 Townsend 9-2558

CHICAGO  
Cliffside 4-7011

LOS ANGELES  
ANGELES 3-7479

For more data circle 413 on Postpaid Card

## free literature . . .

### Relays

American Machine and Foundry Co., Potter and Brumfield Division, Princeton, Ind. 16 page, two color catalog shows the complete P&B line of electromagnetic relays. Comprehensive engineering data on 42 different series of relays is included. Mounting data and descriptions of a wide variety of enclosures is given, as well as information on various terminals.

For more data circle 33 on Postpaid Card

### Limit Switches

The National Acme Co., 183 East 131st St., Cleveland 8, Ohio. Four page, illustrated Bulletin EC-SLS-60 describes the SLS Series Snap-Lock Limit Switch, featuring the new shock resistant, self-cleaning sliding contacts designed to withstand a 2,000 pound shock test.

For more data circle 34 on Postpaid Card

### Welding School

The Lincoln Electric Co., Department 2411, Cleveland 17, Ohio. Bulletin outlines the program in arc welding education. The Lincoln Welding School teaches the skills necessary to use various metallic arc welding processes. A basic five week course covers fundamentals of the manual metallic arc welding process.

For more data circle 35 on Postpaid Card

### Metal Stampings

Dayton Rogers Manufacturing Co., Minneapolis 7, Minn. Eight page, color brochure on metal stampings in small lots. Of particular interest is the section on suggested basic designs.

For more data circle 36 on Postpaid Card

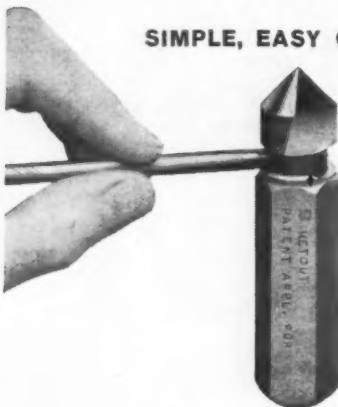
### Timesaving Tools

Montgomery and Co., Inc., 411 Morris Ave., Springfield, N. J. 64 page booklet covers numerous products, including die handlers, floor cranes, shop equipment, inspection equipment, layout tools, angle plates and workholders for sawing, shaping, punch press, milling, grinding, and drilling.

For more data circle 37 on Postpaid Card

## NEW! METCUT Single Flute Countersinks

### SIMPLE, EASY CAM-SHARPENING!



*Metcut sharpening system eliminates errors, expensive set-ups • extends life of cutters • assures accuracy throughout tool life • one fixture for complete size range to 1½"*

Patent Applied For

Here's a single flute cutter for deburring, chamfering or countersinking which you can resharpen with little effort and expense, always maintaining original tool accuracy.

Long tool life and chatter-free cutting with fine finishes are assured. Simple fixture has cam-clearance built-in and transfers correct form to cutters when properly positioned on any conventional grinder or cutter sharpener. No other tooling required.



### COMPLETE SET 6 CUTTERS\* INCLUDING SHARPENING FIXTURE

Sizes ¼", ¾", 1½", 3¼", 1", 1½" **\$37.50**  
Specify included angle of 60°, 82° or 90°.

\* Individual cutter sizes may be ordered separately

Send for complete description and data sheet

**METAL CUTTING TOOLS, Inc., Rockford, Illinois**

For more data circle 414 on Postpaid Card

### Drill Presses

Rockwell Manufacturing Co., Walker-Turner Division, Department 1016, 400 North Lexington Ave., Pittsburgh 8, Pa. Six page brochure illustrates and describes the new line of Walker-Turner light-heavy-weight, 17 inch drill press equipment. Included are 19 illustrations, specification data, charts and tables on all features of the new line.

For more data circle 38 on Reader Service Card

### Turret Drill

Burg Tool Manufacturing Co., Inc., 15001 South Figueroa St., Box 311, Gardena, Calif. Bulletin illustrates and gives complete specs of the Model 3BHT-B Tape Controlled, Eight Spindle Turret Drilling, Tapping and Boring Machine.

For more data circle 39 on Reader Service Card

### Ballistic Flarer

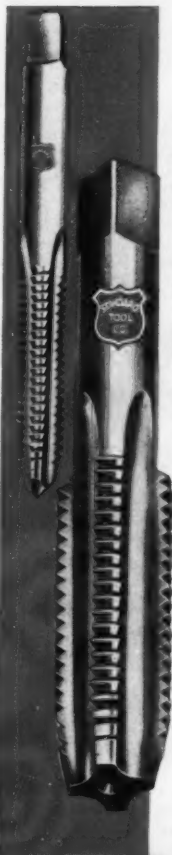
Parker-Hannifin Corp., Parker Fittings and Hose Division, 17325 Euclid Ave., Cleveland 12, Ohio. Bulletin 4392B14 is a four page folder that describes the ballistic flarer—this is a cartridge actuated tool that makes possible the flaring of even heavy wall stainless steel tubing.

For more data circle 40 on Reader Service Card

### Semi-Automatic Wheel Grinders

Landis Tool Co., Waynesboro, Pa. 16 page catalog illustrates and describes the new Landis 10 and 14 inch Type IWR semi-automatic wheel grinders, the principal advantages of which is its ability to simultaneously grind multiple line diameters in one operation. Request Catalog IWR-60.

For more data circle 41 on Reader Service Card



## ...Controlled manufacture of STANDARD'S TAPS...assures these PLUS Features!...

- 1 All flutes are Index ground.
- 2 Flute contours, Hook and Rake Angles Constant, One Tap to another.
- 3 Concentric on all lands—no high or low cutting edges.
- 4 Shanks, outside diameter, pitch diameter and chamfer all in perfect concentricity.

DEPEND upon STANDARD'S Authorized Distributors  
For Taps, Drills, Reamers, Taps, Counterbores, End Mills, Milling Cutters, Hobs, Gages, Dies, Carbides (solid or tipped) and for Engineering or Technical Information.

**STANDARD TOOL CO.**  
3930 CHESTER AVENUE CLEVELAND 14, OHIO  
BRANCH WAREHOUSES IN: NEW YORK • DETROIT • CHICAGO • DALLAS • LOS ANGELES • SAN FRANCISCO

For more data circle 415 on Postpaid Card

## free literature . . .

### Alloy

Wall Colmonoy Corp., Stainless Processing Division, 19345 John R St., Detroit 3, Mich. Two page Microbraz engineering data sheet (No. 2.1.4) describes W. G. Microbraz brazing alloy. The literature describes the material and lists its engineering and brazing properties. Recommended uses are listed and an illustrated typical case history application example is also included.

For more data circle 42 on Postpaid Card

### Wet Abrasive Cutting Machine

American Chain and Cable Co., Inc., Allison-Campbell Division, 931 Connecticut Ave., Bridgeport 2, Conn. Bulletin DH-63 describes the Campbell Model 412 wet abrasive cutting machine, designed for cutting-off operations in steel mills, forge shops and other heavy industries.

For more data circle 43 on Postpaid Card

### Air Powered Tools

The Stanley Works, Stanley Electric Tools Division, 9112 Elm St., New Britain, Conn. Four page, color brochure presents Stanley Air Power for the

Sixties. Stanley now offers a complete range of power equipment—including air powered motors, routers and the "Unishear" Metal Cutting Shears for both standard and specialized high speed production work.

For more data circle 44 on Postpaid Card



## THE MOST USEFUL TOOL IN YOUR SHOP

### Economy Elevating Table

- DIE HANDLER
- LOAD LEVELER

Dimensions . . . . . 24" x 36"  
Capacity . . . . . 2000 lbs.

- CONSTANT HEIGHT TABLE
- PORTABLE WORK TABLE

Lift . . . . . 24" min. to 42" max.  
Price: F.O.B. Chicago \$245.00

**Free 10 day trial in your plant with return privilege**

#### POSITIVE PERFORMANCE

Self-locking Acme screws hold load safely, securely, at any height.

#### COMPACT DESIGN

No projecting parts—all four sides accessible; crank studs at both ends; three table surfaces.

**ECONOMY**  
ENGINEERING

4507 W. Lake St., Chicago 24, Ill.

### Milling Cutters

Wesson Co., 1220 Woodward Heights Boulevard, Ferndale 20, Mich. 44 page Catalog No. M-860 gives complete specifications on the Wesson lines of throw away and conventional carbide milling cutters, accessories, blades, parts and tools.

For more data circle 45 on Postpaid Card

### Air Cylinders

Hannifin Co., Department 166, 565 South Wolf Road, Des Plaines, Ill. Bulletin 0230-B1 provides concise engineering data and specifications on the maximum 200 p.s.i. Series "S" Midget Air Cylinder.

For more data circle 46 on Postpaid Card

For more data circle 416 on Postpaid Card

#### Arbors and Accessories

The Cincinnati Milling Machine Co., Milling Machine Division, Cincinnati 9, Ohio. Catalog No. M-2029 presents Cincinnati Arbors and Accessories in an attractive and easy-to-find manner.

For more data circle 47 on Postpaid Card

#### Gear Finishers

Michigan Tool Co., 7171 East McNichols Road, Detroit 12, Mich. Eight page Bulletin No. 870-60 describes a line of gear finishers. In addition to picturing

and describing the features, the bulletin covers the three methods of shaving that can be used: underpass, transverse and modified underpass.

For more data circle 48 on Postpaid Card

#### Vertical Turners

The Motch and Merryweather Machinery Co., 1221 East 222nd St., Cleveland 17, Ohio. Catalog No. VT-123 shows that these vertical turners are assembled by the building block principle to meet the specific requirements of each customer.

For more data circle 49 on Postpaid Card

## Wilson "Superficial" makes Shallow Measurements Accurately

Wilson Rockwell Superficial hardness testers are used to measure surface hardness, coatings, thin metal or thin hard cases. The hardness test is based on a penetration of less than .005", and Wilson Superficial testers have the precision and ease of operation to give accurate readings every time.

**Accurate**—Precision-built for consistently correct results.

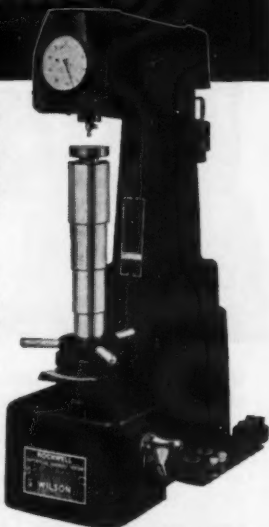
Knife-edge bearings provide near-frictionless operation.

**Easy to operate**—Controls conveniently grouped—oil dash-pot system provides smooth load application.

**Long lasting**—Simple design, rugged construction make Wilson Superficial testers as durable as a machine tool.

**Complete line available**—Wilson Rockwell hardness testers and accessories are available in a wide variety for every hardness testing function. Also "Brale" diamond penetrators for perfect readings every time.

**Write for details**—Ask for Catalog RT-58. It gives complete information on the Superficial tester as well as on the full line of Wilson Rockwell hardness testers.



Wilson Rockwell Superficial  
Hardness Tester

# WILSON "ROCKWELL" HARDNESS TESTERS

Wilson Mechanical Instrument Division  
American Chain & Cable Company, Inc.

230-G Park Avenue, New York 17, New York

For more data circle 417 on Postpaid Card



## free literature . . .

### Power Tools

Rockwell Manufacturing Co., Delta Power Tool Division, 606A North Lexington Ave., Pittsburgh 8, Pa. Newly revised, 92 page catalog describes a complete line of industrial power tools and accessories, including drill presses, grinders, shapers, planers, jointers, metal and wood cutting lathe, tilting arbor saws, unisaws, band saws and radial saws.

For more data circle 50 on Postpaid Card

### Bonded Lubricant

The Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn. Bulletin 129 describes the characteristics of Molykote PVE, a bonded lubricant coating for ferrous surfaces. The bulletin gives full specifications and includes data from actual tests of the material on metal cutting tools.

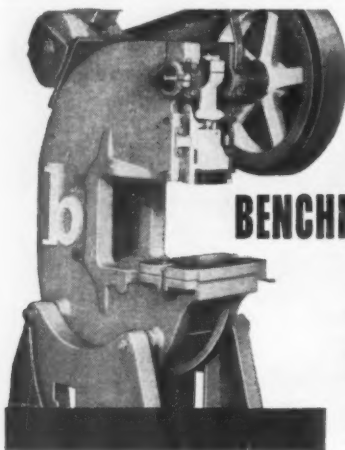
For more data circle 51 on Postpaid Card

### Gaging Equipment

Micrometrical Manufacturing Co., 3621 South State Road, Ann Arbor 7, Mich.

Flyer on the Profilometer Type RE Rotary Pilot, which provides a means for high production checking of surface roughness in microinches around surfaces of rotation and across the radii of small parts, both internal and external.

For more data circle 52 on Postpaid Card



## MEASURE THIS BENCHMASTER THROAT

...the small press  
that does  
**BIG** press jobs!

There's no matching Benchmaster variety and versatility. For example,

Benchmaster makes 17 different press models with many variations of each . . . in stroke length, shut height and throat depth.

This 8 ton **BENCHMASTER DEEP THROAT PRESS** is typical of Benchmaster strength and ruggedness. It punches to the center of a 24" circle, comes in a choice of 3 shut heights: 9", 12" or 15" exclusive of bolster plate. Stroke lengths to 3".

**OTHER BENCHMASTERS** furnished in 2, 5, 8 and 10 ton models in Plain OBI, Back-Geared, Deep Throat, Half Press, Fixed Bed Gap Frame, and Multiple Ram models.

**WRITE FOR CATALOG,**  
prices and recommendations.

# benchmaster



World's largest  
manufacturer of small punch  
presses and mills.

1835 W. Rosecrans Avenue • Gardena, California

For more data circle 418 on Postpaid Card

### Collet Chucks

Erickson Tool Co., 34354 Solon Road, Solon, Ohio. Eight page, two color catalog describes Erickson's line of collet chucks and collets for work or tool holding. Included are descriptions, dimensions, applications and data on specials for '01, '09 and '03 Series Chucks.

For more data circle 53 on Postpaid Card

### Hydraulic Cylinders

Mo-Bar Hydraulics Co., Crystal Lake, Ill. Bulletin No. 203 presents the Series "M" Mo-Bar Hydraulic Cylinders—500 to 2,000 p.s.i., medium pressure, 1½ to 14 inch bore.

For more data circle 54 on Postpaid Card



#### **Holding Tools**

Seibert and Sons, Inc., 1001 East 24th St., Chenoa, Ill. Flyer describes Seibert Holding Tools—extension sockets, plain sleeves, counterbore and spotface holders, conversion sleeves and turret toolholders.

For more data circle 55 on Postpaid Card

#### **Form Tools and Blanks**

The Somma Tool Co., Inc., 120 Scott Road, Waterbury, Conn. Catalog No. 61 covers a complete line of standard circular form tools and blanks for use in automatic screw machines. Featured is a complete range of cut-off and form tool blanks made of T-15 Vasco Supreme High Speed Steel. Also listed are Somma Grinding Arbors for all sizes of Brown and Sharpe and Davenport tools.

For more data circle 56 on Postpaid Card

#### **Steel Stamps**

The Acromark Co., 9 Morrell Street, Elizabeth 4, N. J. Steel stamps color folder, four pages, with illustrations and prices on single steel letter and figure stamps; also sets in all sizes. Includes chart for sizes ranging from 1/32 to 1/2 inch in Gothic style.

For more data circle 57 on Postpaid Card

#### **Uncoiler**

F. A. Woehr Machine Co., 15D Favor St., Rochester, N. Y. Flyer presents the Woehr UC-1048 Uncoiler and the Model RC-1048 Recoiler. Special features and specifications are covered for both of these machines.

For more data circle 58 on Postpaid Card

#### **Angle Screwdriver**

Gardner-Denver Co., Quincy, Ill. Flyer on the 12G-3 Series Angle Screwdriver with standard straight handle. It has 3/8 inch capacity.

For more data circle 59 on Postpaid Card

#### **Saw Tips and Dies**

Adamas Carbide Corp., Kenilworth, N. J. Price List No. CST-1260 covers the company's standard line of carbide saw tips and Price List No. RD-1260 covers its standard line of rough cored wire drawing dies.

For more data circle 60 on Postpaid Card

# \$990\*

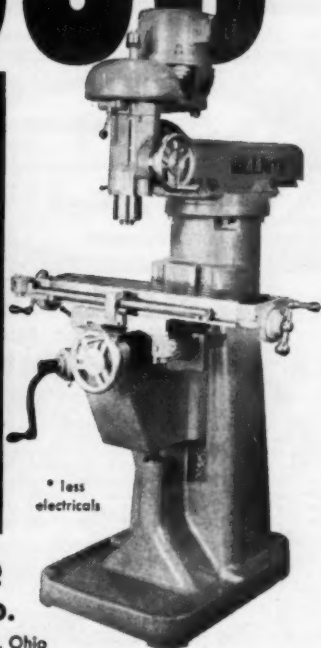
## **BUYS FULL-SIZE**

3/4" Collet Capacity

## **RAM & TURRET VERTICAL MILL**

Mass production by Cincinnati craftsmen permits the precision built Millrite® to sell for this low, low price. It's engineered with numerous exclusive features to add to ease of operation, rigidity, and lasting low maintenance costs.

Write for NEW folder giving full details of this amazing machine tool value.



\* less  
electricals

## **U.S. Burke MACHINE TOOL CO.**

3 Brotherton Rd. Cincinnati 27, Ohio

For more data circle 419 on Postpaid Card

**BUILT TO LAST AND LAST AND LAST**



## **WILLIAMS SUPERJUSTABLE WRENCHES**

All Williams Superjustable Wrenches feature an exclusive D-slot design for positive bearing of movable jaw that eliminates spreading action . . . gives longer-lasting service . . . reduces parts replacement. Available in regular or locking styles with chrome or black finish. Chrome style also available with *Crescent* black insulated handles. All styles drop-forged from selected alloy steel and heat-treated. Your Williams Distributor can give fast service.

**SIX STYLES, THIRTY-THREE SIZES  
LENGTHS FROM 4 TO 24 INCHES**

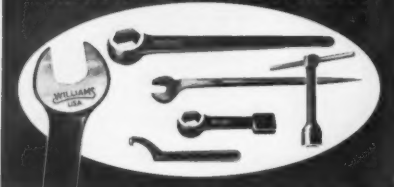
**J. H. WILLIAMS & CO.**

DIVISION OF UNITED-GREENFIELD CORPORATION  
412 VULCAN ST., BUFFALO 7, N. Y.



For more data circle 420 on Postpaid Card

**STRENGTH • DESIGN • ECONOMY**



## **WILLIAMS INDUSTRIAL BLACK WRENCHES**

Here is the same high quality design and manufacture as the famous Williams' Alloy Wrenches with the following industrial features. New, rust-resistant black oxide finish, chemically applied, lowers cost . . . will not chip or wear off. High luster head and face polishing are omitted to lower average cost. These economy features are important where wrench replacement rate is high. Made from strong, tough steel, carefully heat-treated. See your Williams Distributor.

**33 PATTERNS—354 STYLES  
OPENINGS FROM 3/16" TO 7-5/8"**

**J. H. WILLIAMS & CO.**

DIVISION OF UNITED-GREENFIELD CORPORATION  
412 VULCAN ST., BUFFALO 7, N. Y.



For more data circle 421 on Postpaid Card

164 MODERN MACHINE SHOP

**free literature . . .**

### **Drilling-Layout Machine**

Wales Stripplitt, Inc., 207 Buell Road, Akron, N. Y. Four page Catalog FD presents the Stripplitt Flex-O-Drill Drilling-Layout Machine, Model 25-B. This unit drills, seams, center punches and scribes.

For more data circle 61 on Postpaid Card

### **Sliding Bolster Presses**

Niagara Machine and Tool Works, 683 Northland Ave., Buffalo 11, N. Y. Product Report No. 1 describes how inclinable, straight side and other Niagara presses, equipped with sliding bolsters, reduce die changeover time from hours to minutes.

For more data circle 62 on Postpaid Card

### **Chipbreaker Drill**

Chicago Heights Steel Co., Speedicut Division, Chicago Heights, Ill. Brochure presents the Speedicut "Chipbreaker", available in stub screw machine lengths. The Chipbreaker permits uninterrupted drilling and eliminates down time for cleaning out packed spinnings and swarf.

For more data circle 63 on Postpaid Card

**LONG-LASTING • SPRING RESISTANT**



## **WILLIAMS DROP-FORGED "C" CLAMPS**

Made from tough, carefully selected steel, specially heat-treated to increase strength and reduce liability of springing. Screws threaded

for rapid adjustment . . . thru-hardened for extra life. Swivels designed for permanent retention on screws. Heavy Service in 11 sizes up to 12 1/2" cap. General Service in 9 sizes up to 18" cap. Deep Throat in 7 sizes up to 12" cap. Spatter-Resisting in 7 sizes up to 12" cap. Tool-Makers in 4 sizes up to 4 1/2" cap. Also Machinists' Clamps, 4 sizes up to 4 1/2" cap.

**FIVE STYLES IN 38 SIZES  
SEE YOUR WILLIAMS DISTRIBUTOR**

**J. H. WILLIAMS & CO.**

DIVISION OF UNITED-GREENFIELD CORPORATION  
412 VULCAN ST., BUFFALO 7, N. Y.



For more data circle 422 on Postpaid Card

March, 1961

#### **Tape Controlled Lathe**

The American Tool Works Co., Pearl St. at Eggleston Ave., Cincinnati 2, Ohio. Bulletin 912-A presents the American 2509 Tape Controlled Lathe, which has been designed from the ground up to give faster, more economical and more automatic production.

For more data circle 64 on Postpaid Card

#### **Measuring Machine**

Mahr Gage Co., Inc., 274 Lafayette St., New York 12, N. Y. Flyer on a super precision measuring machine reading in 50 millionths — the super comparator bench micrometer. It has a non-rotating spindle and interchangeable measuring anvils.

For more data circle 65 on Postpaid Card

#### **Optical Comparator**

Jones and Lamson Machine Co., Optical Comparator Division, 521 Clinton St., Springfield, Vt. Brochure on Model PC-14A Optical Comparator and Measuring Machine gives details on this newest addition to the J&L line. This is an economy model 14 inch screen comparator.

For more data circle 66 on Postpaid Card

#### **MOST FLEXIBLE WRENCH SYSTEM**



Save valuable time with these versatile SUPERSOCKETS®. Regular, deep and universal sockets come in hex, 12 pt., square and 8 pt. styles from  $\frac{3}{16}$ " to 3- $\frac{1}{2}$ ". Metric openings from 10 to 36 mm. Five square drive sizes:  $\frac{1}{4}$ ",  $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{3}{4}$ " and 1" ... plus ratchets, extensions, and special attachments to form hundreds of wrench combinations.

Made from selected alloy steel, heat-treated and chrome-plated. Order from your Williams Industrial Distributor.

88 DRIVERS & ATTACHMENTS

235 SOCKETS—5 DRIVE SIZES

J. H. WILLIAMS & CO.

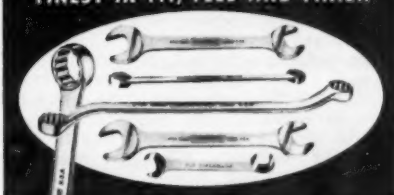
DIVISION OF UNITED GREENVILLE CORPORATION  
412 VULCAN ST., BUFFALO 7, N. Y.



For more data circle 423 on Postpaid Card

March, 1961

#### **FINEST IN FIT, FEEL AND FINISH**



#### **WILLIAMS OPEN-END and BOX SUPERRENCHES®**

Specially selected alloy steel withstands heavy industrial use. Thin heads combine maximum strength with greatest clearance. Precision broached openings are designed for full bearing on all series nuts and bolts. Slim handles and smooth contours provide safe, balanced grip. Drop-forged, heat-treated and chrome plated. Available from your Williams Distributor individually, or in sets.

40 STYLES—OVER 450 SIZES  
OPENINGS FROM  $\frac{3}{16}$ " TO 3- $\frac{1}{8}$ ".

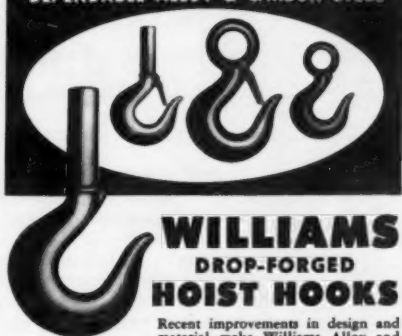
J. H. WILLIAMS & CO.

DIVISION OF UNITED GREENVILLE CORPORATION  
412 VULCAN ST., BUFFALO 7, N. Y.



For more data circle 424 on Postpaid Card

#### **DEPENDABLE ALLOY & CARBON STEEL**



Recent improvements in design and material make Williams Alloy and Carbon Steel Hooks the strongest, safest to specify. Each is heat-treated for maximum toughness and high impact resistance. All are proof-tested to military standards to 50% beyond safe working loads. Available in eye and shank styles in regular and safety patterns. Safety latches feature non-corrosive snap springs with positive, safety action. Alloy steel capacities up to 70 tons ... carbon steel capacities up to 60 tons. Order from your Williams Distributor.

SIXTEEN STOCK SIZES  
CAPACITIES UP TO 70 TONS

J. H. WILLIAMS & CO.

DIVISION OF UNITED GREENVILLE CORPORATION  
412 VULCAN ST., BUFFALO 7, N. Y.



For more data circle 425 on Postpaid Card

MODERN MACHINE SHOP 165

## free literature . . .

### Packaged Hydraulic Systems

Vickers, Inc., Detroit 32, Mich. The application of packaged hydraulic systems to solve a wide range of process control problems is the subject of this six page bulletin. Whether used for valve control or power transmission, these systems set the standard for simplicity of installation and reliability in operation.

For more data circle 67 on Postpaid Card

### Power Presses

Johnson Machine and Press Corp., 620 West Indiana Ave., Elkhart, Ind. Catalog No. 60 covers complete specifications on 50 models of Johnson Power Presses. These include inclinable, straight side, gap and horn. Also covered is the Johnson Hydra-Shear.

For more data circle 68 on Postpaid Card

### Tap Selector

The Hanson-Whitney Co., 269 Bartholomew Ave., Hartford, Conn. Revised and expanded "Tap Selector" lists, by an easy-to-order catalog number, more than 1,200 different sizes and types of standard taps which are all available from stock. Recommendations are made to solve practically any tapping problem, regardless of the material, type of hole or class of fit. A complete price list is included with this selector.

For more data circle 69 on Postpaid Card

## What's Your Toughest Surface Measurement Problem—

- ☐ Measuring roughness of parts that are
  - ☐ Extra-smooth?
  - ☐ Inside small ID's?
  - ☐ Short or narrow?
  - ☐ Remotely located?
  - ☐ Concave or convex?
  - ☐ Of critical importance?
- ☐ Measuring height and width of waves, bows, steps and other widely-spaced irregularities?
- ☐ Measuring individual pits, flaws, scratches?
- ☐ Measuring waviness around surfaces of rotation?
- ☐ Other: \_\_\_\_\_

Check and return this, and we'll send free literature on standard or special Profilometer®, Proficorder®, Microcorder® or Wavometer® equipment for the job.

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_ DEPT. \_\_\_\_\_

ADDRESS \_\_\_\_\_



**MICROMETRICAL**  
MANUFACTURING COMPANY

A SUBSIDIARY OF THE BENDIX CORPORATION

3621 S. STATE RD., ANN ARBOR 7, MICHIGAN

For more data circle 426 on Postpaid Card

### Tool Steel

Universal - Cyclops Steel Corporation, Bridgeville, Pa. An unusual and easy-to-use Tool Steel Identifier is in the form of a compact slide rule. It covers a complete listing with over 600 brand names of tool steels identified. This 6 by 12 inch Tool Steel Identifier reveals the brand name, the producer, the AISI number and the Universal-Cyclops equivalent brand at a glance through windows which are located on both sides.

For more data circle 70 on Postpaid Card

### Templates

Northwestern Tools, Inc., 119 Hollier Ave., Dayton 3, Ohio. Set of full scale tracing templates that were designed for companies who manufacture jigs, fixtures and special machinery. It includes over 200 components most often used by the industry.

For more data circle 71 on Postpaid Card

### Sliding Head Drill

Cincinnati Lathe and Tool Co., Cincinnati 9, Ohio. How to achieve the cost reducing advantages of numerically controlled drilling with relatively low cost equipment investment is described in this catalog covering the Cincinnati Sliding Head Drilling Machines.

For more data circle 72 on Postpaid Card

### Combination Lamp

Luxo Lamp Corp., Port Chester, N. Y. Flyer on the "Combo" — the Combination Lamp with precision balance, feather touch positioning and harmonious color rendition. The unit balances incandescent and fluorescent light in one advanced design head.

For more data circle 73 on Postpaid Card

### Aluminum Ingot

Aluminum Company of America (Alcoa), 1501 Alcoa Building, Pittsburgh 19, Pa. "Aluminum Casting Alloy Ingot" is a new, 12 page brochure that presents revised terminology, text and tabulated information on the benefits to metal users of methods employed by Alcoa to insure the production of top-grade ingot.

For more data circle 74 on Postpaid Card

### Motorized Drives

Howell Electric Motors Co., Howell, Mich. Bulletin MD-1 is a six page, color brochure on the company's line of gear-motors and line-o-drives.

For more data circle 75 on Postpaid Card

### Indexing Tables

AA Gage Co., 350 Fair St., Detroit 20, Mich. 12 page Catalog U-100 presents complete technical specs and illustrates typical applications for the high precision Ultradex Indexing Tables.

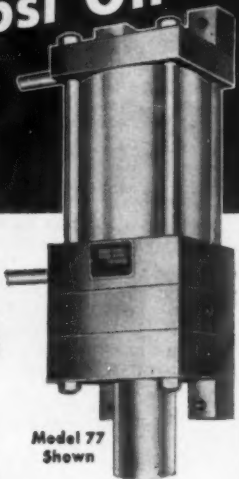
For more data circle 76 on Postpaid Card

Up To  
**10,000 psi Oil**  
from  
**Shop Air!**

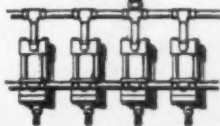
 **AIR TO  
HYDRAULIC  
BOOSTERS**

**No Pumps or High Pressure  
Valving Needed**

Hook a Miller Air-Hydraulic Booster to your air line and get INTENSIFIED (ratios up to 100 to 1) Hydraulic Power that you can vary and control at will and use for such common shop operations as punching, clamping, pressing, riveting, shearing, welding, crimping, testing, etc. High pressure booster output drives the hydraulic work cylinders and can be directly applied (without cylinders) in testing, measuring, other applications. Boosters save air, space, weight, require little or no maintenance, and hold pressure as long as desired without additional power consumption. Models for immediate delivery.



**Model 77  
Shown**



**Write For  
Full Details**



**FLUID POWER DIVISION**

Flick Reedy Corp.

**7N023 YORK RD., BENSENVILLE, ILL.**

For more data circle 427 on Postpaid Card

## free literature . . .

### Punches and Shears

Hendley and Whittemore Co., 100 Blackhawk Boulevard, South Beloit, Ill. Condensed Catalog No. 14-HA covers Hendley Beliot metalworking machines, including combined power punches and shears, power splitting shears—single back geared, power splitting shears—double back geared, alligator shears, plate frame punch and shear, power punches, angle bending rolls and hand operated punches and shears.

For more data circle 77 on Postpaid Card

### Flexible Shaft Machines

N. A. Strand Flexible Shaft, Inc., 601 South Washtenaw Ave., Chicago 12, Ill. Catalog No. C-500 presents the Strand Single Speed, Direct Drive Flexible Shaft Machines. A flyer is included on the DIH-3 Speedflex—the answer to small wheel, high speed operations.

For more data circle 78 on Postpaid Card

### Flame Cutting Machines

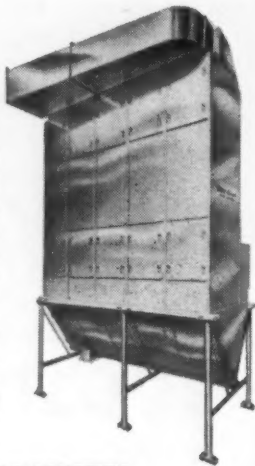
Linde Co., 270 Park Ave., New York 17, N. Y. Complete line of Oxweld flame cutting machines is described in this 28 page catalog (Form 1396). Machines

described range in size from small, handy portable machines that can be carried around a shop by one man to huge multi-torch shape-cutting machines capable of reproducing tens or thousands of the most intricate shapes and patterns in steel.

For more data circle 79 on Postpaid Card

## NEW TORIT DUST COLLECTOR IS AUTOMATIC!

Save real dollars with the benefits from this automatic dust collector. No more interruptions on production lines! Maintenance problems are practically eliminated. This all new continuously cycling TORIT dust collector automatically cleans your air and automatically shakes its own filters and blows them clean with reverse air flow. Collected material is emptied automatically.



### OTHER EXCLUSIVE TORIT BENEFITS

- automatic filter-shaker mechanism is simple, maintenance-free
- different dusts may be collected separately
- highest air-to-cloth ratios (from 5 to 25:1) and longer filter life
- only  $\frac{3}{4}$  H.P. required for fully automatic operation
- polished  $\frac{3}{4}$ " aluminum construction for minimum floor loading
- modular design—5' wide x 4'-8" long (for two sections) x 15'-6" high—saves space, lends ease and versatility to installation. Use up to 12 modular sections for each application! No limit to CFM capacity!

Write today for literature.

## TORIT MANUFACTURING COMPANY

Automatic Collector Division

1133 Rankin Street, St. Paul 16, Minnesota, Dept. 735

For more data circle 428 on Postpaid Card

### Abrasive Disc

The Carborundum Co., Coated Abrasives Division, Post Office Box 337, Niagara Falls, N. Y. Four page bulletin describes a fiber-backed abrasive disc for lighter grinding operations, where little or no dressing action is involved.

For more data circle 80 on Postpaid Card

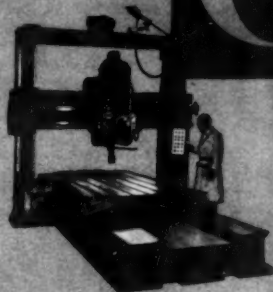
### Punches and Dies

Federal Machinery Corp., 134 Grand St., New York 13, N. Y. Catalog 60 PD has been compiled to facilitate purchases of standard punches and dies of various types.

For more data circle 81 on Postpaid Card



# Carlton

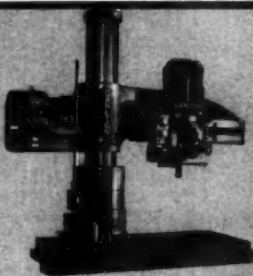


**NEW PLANER TYPE BORING AND DRILLING MACHINE** with automatic positioning. Accurately locates work for boring, reaming, drilling, tapping. Bulletin ARS.

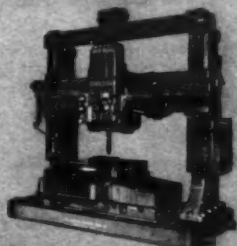


**HORIZONTAL DRILLS** provide production boring and drilling facilities for huge, irregular shaped parts that can't be handled under standard machines. Bulletin C-217.

*for all your heavy duty boring and drilling requirements*



**RADIAL DRILLS.** The best known, most highly respected and widely used radial drills. Made in column diameters from 9" to 26", arm lengths from 3 ft. to 12 ft. Write for bulletins.



**NEW VERTICAL DRILLING MACHINE** with automatic positioning (or spacing) table. Introduces jigless heavy duty boring and drilling, puts it on a production basis for the first time. Bulletin C-216.

**NOW: NUMERICAL CONTROL** by Carlton Controls Corp. for Carlton 4H and 5H horizontal drills and for Model ARS planer type boring and drilling machine. Write for complete information.

THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO / Specialists in boring and drilling machines since 1916

For more data circle 429 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 169

# WINTER MULTI TAPS

for accurate  
tapping of  
soft metals



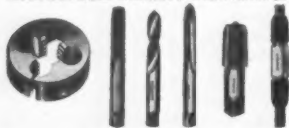
Versatile Winter Brothers Multi Taps answer the need for a single, effective tool for tapping of soft or annealed aluminum, magnesium, stainless steel and some types of copper.

Specially surface-treated to retard abrasion encountered in these materials, Winter Multi Taps provide exceptionally long, accurate tool life that materially reduces cost-per-hole.

Multi Taps are designed and manufactured to famous Winter **Balanced Action** tool standards. Flute contours are absolutely uniform. Chip driver contours are of maximum precision. Exact flute spacing, plus rigidly-held accuracy and concentricity of chamfers, are your assurance of peak production tapping performance. Specify Winter **Balanced Action** Multi Taps the next time you order!

**WINTER BROTHERS COMPANY** Rochester, Michigan, U.S.A.  
DISTRIBUTORS IN PRINCIPAL CITIES. BRANCHES IN NEW YORK  
CHICAGO • DALLAS • SAN FRANCISCO • LOS ANGELES

CHOOSE FROM WINTER'S WIDE LINE OF TAPS, DIES AND GAGES



CALL YOUR  
WINTER DISTRIBUTOR

For more data circle 430 on Postpaid Card

## free literature . . .

### Ball Bearings

The Fafnir Bearing Co., 37 Booth St., New Britain, Conn. 60 page catalog on wide inner ring ball bearings and power transmission units. Catalog contains complete specification charts, diagrams and photographs. Wide inner ring ball bearings are designed for users who need ball bearings which can be easily mounted on straight shafts and positioned without shoulders, lock-nuts or adapters.

For more data circle 82  
on Reader Service Card

### Extruded Rectangles

Ampco Metal, Inc., 1745 South 38th St., Milwaukee 1, Wis. 22 new stock sizes of extruded rectangles are included in this revised bulletin. The four page, two color Bulletin G-50b describes Ampco's line of extruded rectangles for severe wear and abrasion applications.

For more data circle 83  
on Reader Service Card

### Dial Calliper

Scherr-Tumico, Inc., St. James, Minn. Flyer on the Mauser Dial Calliper, for the ultimate in measuring accuracy. It is stainless steel hardened throughout and has a 5 inch measuring capacity.

For more data circle 84  
on Reader Service Card

### Magnetic Disc Brakes

Stearns Electric Corp., 120 North Broadway, Milwaukee 2, Wis. Bulletin 605 gives information on the company's complete line of magnetic disc brakes. Complete engineering data, along with dimensional information, is included.

For more data circle 85  
on Reader Service Card

#### Cut-Off Wheels

Simonds Abrasive Co., Tacony and Fraley Sts., Philadelphia 37, Pa. Form No. ESA-163 presents regular resinoid bonded abrasive cut-off wheels. Information is presented about production cutting use, as well as general use in tool-rooms and machine shops.

For more data circle 86  
on Reader Service Card

#### Mounted Points

American Emery Wheel Works, 1 Richmond Square, Providence, R. I. Bulletin No. SS-101 is a new and detailed brochure of 113 special shape mounted point wheels. Practically all wheel requirements for offhand grinding can be simply and conveniently ordered from this bulletin.

For more data circle 87  
on Reader Service Card

#### Ram Head Millers


Kearney and Trecker Corp., Milwaukee 14, Wis. Bulletin RS-60 presents the S-12 Ram Head Milling Machines, which offer a choice of three heads—Type U universal swivel, Type Q adjustable quill swivel or Type V vertical swivel head.

For more data circle 88  
on Reader Service Card

#### Furnace

Jones and Laughlin Steel Corp., 3 Gateway Center, Pittsburgh 30, Pa. A full color brochure describes the company's new continuous controlled atmosphere furnace for heat treating cold-finished bars. The four page brochure explains how this furnace—and the Electreat Process—provide a full range of heat treating processes for users of cold-finished bars.

For more data circle 89  
on Reader Service Card



# NATIONAL CENTER CUTTING END MILLS

for greater  
milling efficiency

*National*



National Center Cutting End Mills can materially reduce costs on machining operations where both plunge cutting and traverse milling are required. Designed with teeth extending to the center of the tool, Center Cutting End Mills can initiate their own holes, then continue general milling of the workpiece without the need to change tools.

National Center Cutting End Mills are available in two popular series: "4300" for general purpose milling; "XM" series of specially-treated, premium steel for difficult-to-machine materials.

Center Cutting End Mills, as well as a complete line of conventional end mills, are stocked by your National Distributor. Call him today.

#### NATIONAL TWIST DRILL & TOOL COMPANY

Rochester, Michigan, U.S.A.

DISTRIBUTORS IN PRINCIPAL CITIES. BRANCHES IN NEW YORK  
CHICAGO • DALLAS • SAN FRANCISCO • LOS ANGELES

\*JUST ONE OF NATIONAL'S PARADE OF PLUS PRODUCTS

CALL YOUR  
NATIONAL DISTRIBUTOR



For more data circle 431 on Postpaid Card

MODERN MACHINE SHOP 171

Denison, Denison HydrOlics, and MultiPress are registered trademarks of Denison Eng. Div., ABCO

**DENISON**  
*HydrOlics*

from DENISON -  
a small hydraulic press  
so productive  
your savings are...

# GUARANTEED



**MODEL "A" Denison hydraulic Multipress.** Available in 1-ton and 2-ton ram capacities.

1-ton model . . . . . \$395  
2-ton model . . . . . \$595

**GUARANTEED** savings in your plant—on any job—assembly, forming, staking...or 101 other press operations. Denison's confidence in the field-proven performance of the Model "A" hydraulic Multipress makes this unique offer possible. Check these important advantages—high speed cycle...easy pressure adjustment...foolproof safety controls...manual or automatic operation...ample 8" daylight for tooling...compact size—only 24" high...smooth, controlled hydraulic pressure does all your pressing jobs better and faster...1-ton and 2-ton capacity.

Try this Multipress in your own plant...prove its money-saving advantages to yourself. *Write us today for details.*

**DENISON ENGINEERING DIVISION**  
American Brake Shoe Company  
1254 Dublin Road • Columbus 16, Ohio

HYDRAULIC PRESSES  
PUMPS • MOTORS • CONTROLS

# DENISON

## HYDRAULIC MULTIPRESS

For more data circle 432 on Postpaid Card

## free literature . . .

### Forming and Cutting Tools

Plew Tool Corp., South Line St., Columbia City, Ind. Fully illustrated, 24 page metalworking tool catalog covers a complete line of cold heading, forming and cutting tools.

For more data circle 90 on Postpaid Card

### Press Brake Dies

The Valeron Corp., Press Brake Division, 56 Factory Road, Addison, Ill. Over 360

drawings of standard and special press brake dies are contained in this 28 page colorful catalog. Complete engineering and design service, as well as tryout and reconditioning services, are offered.

For more data circle 91 on Postpaid Card

### Die Springs

The Producto Machine Co., 990 Housatonic Ave., Bridgeport 1, Conn. A broadened line of die springs and accessories is offered in this eight page catalog. Included in the easy-to-use, two color catalog is information on the selection and use of die springs.

For more data circle 92 on Postpaid Card

### Differential Control

Danly Machine Specialties, Inc., 2100 South Laramie Ave., Chicago 50, Ill. Bulletin No. DC-1 covers the Danly Differential Control, which is a safety device that can be used to monitor the relative position of two movable objects.

For more data circle 93 on Postpaid Card

### Calipers

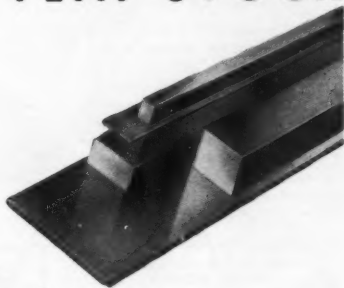
J. T. Slocumb Co., 68 Matson Hill Road, South Glastonbury, Conn. Bulletin No. 2 describes in detail a series of outside micrometer calipers in the 1 to 60 inch size range. Literature includes information on construction materials used, descriptions of a variety of unique and exclusive features, lists part numbers on each instrument and offers complete data on available optional features, such as locknut, vernier, friction stop and friction thimble.

For more data circle 94 on Postpaid Card

# MARSHALL

P R E C I S I O N  
GROUND FLAT STOCK

OILcrat  
AIRcrat  
MARSHALLcrat  
(Low Carbon)



Largest range  
of sizes available  
from factory or call your  
Marshall distributor. Ask about  
SCRIBE-IT the pre-colored  
OILcrat ready for the layout bench.

Sold through selected distributors

The **MARSHALL STEEL CO.**  
*The Aristocrats of Ground Flat Stock*  
**MARSHALLCRAT OILcrat AIRcrat Scribe-IT**  
P. O. BOX 108MM LA GRANGE, ILLINOIS



WRITE FOR CATALOG OR FREE WALL CHART



For more data circle 433 on Postpaid Card

free literature . . .

#### Metalworking Compounds

Macco Products Co., 9203-mm South Sangamon St., Chicago 20, Ill. Product Selector Brochure is pocket size and tells how to select cleaners, cutting lubricants, drawing compounds, rust preventives, forging compounds and extrusion lubricants. It lists 46 compounds in the foregoing categories to simplify selection by pin-pointing to specific applications. For more data circle 95 on Postpaid Card

#### Groove Pins and Grooved Drive Studs

Groov-Pin Corp., 1125 Hendricks Causeway, Ridgefield, N. J. 12 page, two color catalog describes the various types, dimensions and fastening applications of solid Groov-Pins and grooved drive studs.

For more data circle 96 on Postpaid Card

#### Controls, Clamps, Oilers, Tongs

E. A. Baumbach Manufacturing Co., 1812-22 South Kilbourn Ave., Chicago 23, Ill. Baumbach Industrial Supplies Catalog contains data on products such as pendant controls, tongs, demountable leader pins and bushings, clamps, leader pin oil, oilers and punch jacks.

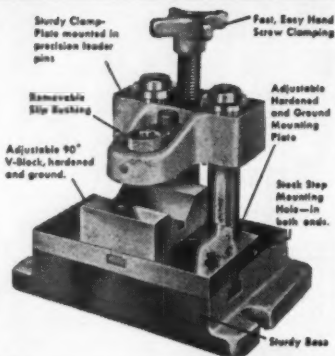
For more data circle 97 on Postpaid Card

## REPCO Time-Saving Tools

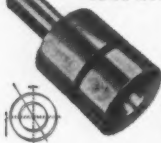
### ADJUSTABLE V-BLOCK DRILL JIG

Saves Set-Up Time—  
Increases Output

Here is a versatile and accurate V-Block that makes center and off-center drilling, tapping, and reaming easy and precise. Four-way V-block adjustment simplifies handling a wide range of work. Fast, easy positioning and clamping speed production. A centering locator plug and T-slots in the mounting surface plates assure fast, easy, on-center adjustment. Drill capacity .80 to 1/4" diameter. Handles stock from 1/4" to 2" diameter.

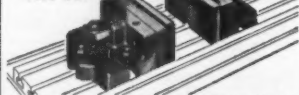


#### TRUE-CENTER ADJUSTABLE TOOL HOLDER



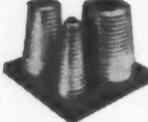
The REPCO Adjustable Holder is a precision-bull tool, having two-piece construction which provides fast adjustment of the main body to compensate for as much as 1/2" machine misalignment. Cuts down on tool wear, breakage, and scrap.

#### TWO-PIECE VISE SET



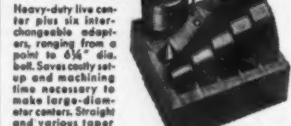
Save time with this versatile 2-Piece Machine Vise Set. Use as general-purpose vise, angle-block, or separate clamping device. Opening limited only to length of machine base. Light, accurate, rigid. Two sizes 6" and 8".

#### CHUCK JAW TRUING-RING SET



This Ring Set saves time, cuts cost of boring jaws. With correct diameter rings on hand, you gain hours of productive time. Plated rings range from 1" to 4" by 1/2" increments. Handy peg-type rack keeps rings in place.

#### COMBINATION LIVE-CENTER SET



Heavy-duty live center plus six interchangeable adapters, ranging from a point to 6/16" dia. ball. Saves costly set-up and machining time necessary to make large-diameter centers. Straight and various taper shanks available.

**REPCO**

Write for complete information—Exclusive agent territories open.

ROCKFORD ENGINEERED PRODUCTS CO.

23rd Avenue and 20th St. • Rockford, Illinois  
For more data circle 434 on Postpaid Card

#### Furnaces

Sunbeam Equipment Corp., Meadville, Pa. Bulletin SEC-12 describes the advantages and features of the new Sunbeam aluminum melting holding furnace for use in permanent mold, sand or die casting plants. For more data circle 98 on Postpaid Card

#### Machinery Mount

Barry Wright Corp., Barry Controls Division, 700 Pleasant St., Watertown 72, Mass. Bulletin 60-04.3 contains complete information on the new Barry Heavy Duty Mount, Series HM. It was designed to support loads up to 128,000 pounds per mount, isolating the shock and vibration of mechanical and hydraulic presses 200 ton capacity and greater.

For more data circle 99 on Postpaid Card



#### Automatic Bar Machines

American Bechler Corp., 28 Harbor St., Stamford, Conn. Four page, two color Bulletin AR-60 describes and gives specs for Bechler Model AR Swiss Automatic Bar Machines and accessories. Operational principles are explained with each part described in detail as to function and features.

For more data circle 100 on Postpaid Card

#### Precision Ground Stock

Vanadium-Alloys Steel Corp., Latrobe, Pa. Binder describes three grades of precision ground stock. The illustrated folder cites the advantages of using precision ground steel and explains the features of each grade, including the chemical composition and typical applications.

For more data circle 101 on Postpaid Card

#### Disc Sander

Powermatic Machine Co., McMinnville, Tenn. Flyer on the Model 35 Disc Sander that is precision built for high production and ultra smooth operation on any sanding, polishing, deburring or burnishing job in school, cabinet and production shops.

For more data circle 102 on Postpaid Card

#### Welding Equipment

Smith Welding Equipment Corp., 2633 Southeast Fourth St., Milwaukee 14, Minn. Two wall charts show the distinctive traits of the Oxy-LP Gas Flame in comparison with the Oxy-Acetylene flame.

For more data circle 103 on Postpaid Card

#### Gaging Equipment

The Indi-Square Co., 1119 East Ridge Road, Rochester 21, N. Y. Catalog on the Indi-Square, which eliminates time consuming effort and uncertainty of inspection and setup for squareness. Flyer shows the new extension indicator bracket which has been added to the Indi-Square as standard equipment.

For more data circle 104 on Postpaid Card

#### Pump

Ingersoll-Rand, 11 Broadway, New York 4, N. Y. Form 70287 describes the 1750K

just **ONE**  
heavy duty unit services up to 19 MACHINES

**DUSTKOP**  
STOPS DUST

In the complete line of Aglet Dust Collectors there are sizes that will service from one to nineteen machines—large or small. Some exhaust cleaned air externally... others clean and recirculate air within your plant. Write for illustrated folder... today.

46 Standard Models—Ready to Use

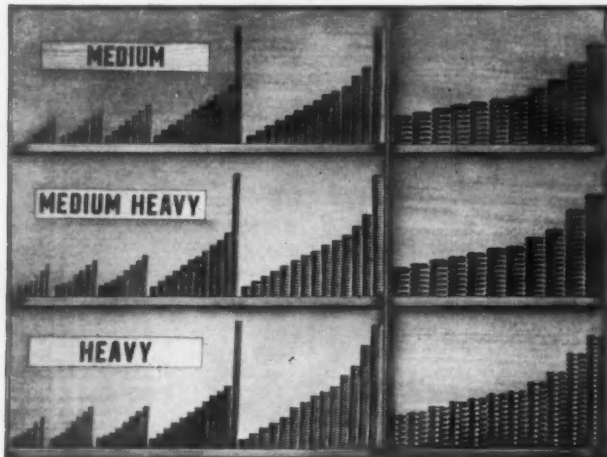
**AGET manufacturing company**  
1398 Church Street • Adrian, Michigan

For more data circle 435 on Postpaid Card

## free literature . . .

Line Motorpump, that has been designed with a 1,750 revolution per minute operating speed in order to assure extremely quiet operation. It is said to be particularly suited for air conditioning and heating installations, as an integral part of washing, cleaning, dairy, beverage and water conditioning machinery, where low noise level may be important, and on machine tools.

For more data circle 105 on Postpaid Card



## Die Springs-CHROME VANADIUM STEEL

Fine quality die springs carried in stock—wide selection of hole and rod sizes, lengths and deflections. Three pressure ranges—medium, medium-heavy,



heavy. Long life reduces down-time.

Write for free list of stock sizes, prices, and name of nearest distributor.

For more data circle 436 on Postpaid Card

## Diamond Abrasives

Diamond Tool Research Co., Inc., 580 Fifth Ave., New York 36, N. Y. Technical Bulletin No. 7 is illustrated with comparative photomicrographs of the various diamond grits and it carefully and completely reviews the latest advances and techniques in the uses of diamond abrasives.

For more data circle 106 on Postpaid Card

## Thread Rolling Machines

Prutton Corp., 5295 West 130th St., Cleveland 30, Ohio. Catalog on the company's planetary thread rolling machines, covering

such applications as thread rolling, roll-forming, marking, serrating and necking of bolts, screws, nails and special parts in many sizes.

For more data circle 107 on Postpaid Card

## Die Sets

Wheatley Economy Die Sets, Inc., 1627 West Fort St., Detroit 16, Mich. Four page, two color brochure on die sets. It gives illustrations, sizes and other technical data on various sizes of Wheatley all steel "Economy" die sets. A price list with quantity discounts is also included in the brochure.

For more data circle 108 on Postpaid Card

## Socket Screw

Standard Pressed Steel Co., Box 556, Jenkintown, Pa. Form 2707 reviews high performance socket head cap screws. These are claimed to have from two to four times the fatigue life of comparable industrial fasteners.

For more data circle 109 on Postpaid Card



Raymond  
Manufacturing  
Division

Associated Spring  
Corporation  
Corry, Pennsylvania

#### Transmission

Western Manufacturing Co., 3400 Scot-ten Ave., Detroit 10, Mich. Two page catalog includes engineering data and complete specifications of a transmis-sion with an electric shift. Electro-magnetic clutches provide speed changes and reversing under power, without interrupting the power source.  
For more data circle 110 on Postpaid Card

#### Valves

Ross Operating Valve Co., 120 East Goldengate Ave., Detroit 3, Mich. Engi-neering informa-tion for the new Ross Headline series fluid power valve in 25 types is offered in eight page Bulletin 323. It contains speci-fications, features and response time of this lightweight, poppet type control unit.  
For more data circle 111 on Postpaid Card

#### Nuts

National Machine Products Co., Utica, Mich. This 16 page condensus includes all of the basic engineering data and specifica-tions on hexagon nuts, standard sizes  $\frac{1}{4}$  to 3 inches; Conelok, Huglock and Mars-den Locknut sizes  $\frac{1}{4}$  to  $1\frac{1}{2}$  inches, specials  $\frac{7}{16}$  to  $4\frac{1}{4}$  inches.  
For more data circle 112 on Postpaid Card

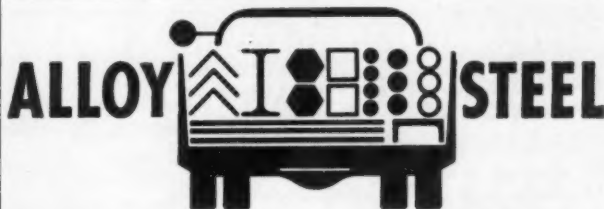
#### Vacuum Furnaces

Lindberg Engi-neering Co., 2450 West Hubbard St., Chicago 12, Ill. Bulletin No. 800 contains eight pages which de-scribe and illus-trate vacuum type furnaces. Pictures and drawings

show hot-wall vertical retort vacuum furnaces, horizontal retort vacuum fur-naces, vacuum bell type furnaces, cold-wall vacuum furnaces and a vacuum atmosphere retort tube for research and pilot plant use.  
For more data circle 113 on Postpaid Card

#### Clamping Cylinders

Airmatic Valve, Inc., 7313 Associate Ave., Cleveland 9, Ohio. Four page, illustrated Bulletin 91036 describes clamping cylinders.  
For more data circle 114 on Postpaid Card



*There's a W-L warehouse near you to meet  
your every requirement promptly*

Wheelock, Lovejoy maintains seven strategi-cally-located warehouses. All of them are com-pletely staffed and completely stocked, to fill your alloy steel needs promptly. Standard AISI and SAE steels, and our own famous HY-TEN steels offering advanced metallurgical features at competitive prices, can be had in bars, billets and forgings, in specified sizes, shapes and treatments.

Write today for *free* Wheelock, Lovejoy Data Sheets, containing complete information on grades, applications, physical properties, tests, heat treating, etc.

**WHEELOCK,  
LOVEJOY**

**& COMPANY, INC.**

*"The Alloy Steel Center"*

140 Sidney Street, Cambridge 39, Mass.

For more data circle 437 on Postpaid Card



# NEWS

## of the industry

**New plants and expansions . . . officers,  
company acquisitions and name changes.**

Edited by L. L. BALDHOFF

### **NORTON COMPANY ANNOUNCES ELECTION OF NEW OFFICERS**

Ralph F. Gow was elected president of Norton Company, Worcester, Massachusetts, at the company's 76th Annual Meeting. He becomes the

seventh president of the largest abrasive manufacturer in the world which operates 25 plants in the United States, Canada and overseas.

Milton P. Higgins, president since 1946, stepped up to chairman of the board, succeeding George N. Jeppson, who remains on the board with the title of honorary chairman.

John Jeppson now becomes the executive vice president, succeeding Ralph F. Gow.

Robert Cushman of Worcester, Massachusetts, and Richard M. Nichols of Wellesley, Massachusetts, were named directors of the company.

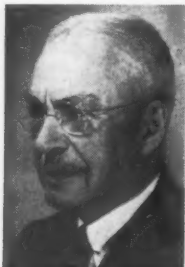
Mr. Cushman replaces John Jeppson as vice president and general manager of the Abrasive Division. He was formerly general sales manager of the Abrasive Division.



*Milton P. Higgins*



*Ralph F. Gow*



*George N. Jeppson*



*Richard M. Nichols*



*John Jeppson*



*Robert Cushman*

## NEW COMPANY TAKES OVER KIDDE PRECISION TOOL

John F. Kidde, president of Walter Kidde and Company, Inc., Belleville, New Jersey, announced the sale of the business formerly conducted by the Kidde Precision Tool Corporation of Roseland, New Jersey, to a newly formed company, the KPT Manufacturing Company.

Joseph W. Mollek, Jr., formerly executive vice president of Kidde Precision Tool Corporation, and John R. Evans, formerly assistant treasurer of the Walter Kidde subsidiaries, will be president and treasurer, respectively, of the new company. Dr. L. K. Herndon, senior vice president of Techno Fund, Inc., will be chairman of the board. The Techno Fund, Inc. of Columbus, Ohio, is making a substantial investment in the new company.

The management of the new company will retain the present operating personnel of the Kidde Precision Tool Corporation and will continue to occupy the existing plant facilities located on Locust Avenue in Roseland, New Jersey.

According to Mr. Mollek, KPT Manufacturing Company intends to continue and expand its operations in the field of high precision machining and welding, particularly in the newer and more exotic metals which have been developed for use in atomic reactors and missiles.

In addition, a program of adding a product line is being planned by the company in order to effect a well balanced manufacturing program.

### 1200°C in less than 10 minutes!

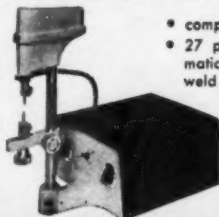
#### with STEWART CONTROLLED ATMOSPHERE FURNACES



- cleaner operation
- faster heating
- faster cooling
- lower operating cost

- utilizes thermal tube as heating element instead of conventional, wire-wound ceramic muffles
- exceptional ease of maintenance; long service life
- air or controlled atmosphere, with single or mixed gases
- accurate pyrometer control of temperature

#### STEWART Precision Resistance "Spot" Welders



- complete package unit; built-in electronic timer
- 27 precision controlled heat positions; automatic or manual firing; 1/120 or 1/60 second weld time
- portable, lightweight; no installation, no holes to drill
- flexible cable foot control, operable from any location
- universal electrode mount; instantly adjustable
- fully adjustable weld pressures

**FREE LITERATURE — Write Today:**  
**STEWART ENGINEERING CORPORATION**  
SANTA CRUZ • CALIFORNIA

For more data circle 438 on Postpaid Card

news of the industry . . .

**NEBEL MOVES TO NEW PLANT**

Nebel Machine Tool Corporation, Cincinnati, Ohio, has moved its manufacturing, engineering and purchasing operations to 600 North Third Street, Hamilton, Ohio. Nebel is already building its line of lathes and Smith and Mills Shapers at the new location.

Once part of Baldwin-Lima-Hamilton Corporation's plant used for mak-

ing large diesel engines, the building has 28,000 square feet of production space, in addition to large office and storage areas. According to Frank J. Fales, Nebel's vice president and general manager, it is well-suited to efficient machine tool production. Mr. Fales has reported plans to use part of the large office area for expansion of Nebel's engineering, production control and methods departments.

Nebel was forced to move these operations from Cincinnati because of

expressway construction. Its sales and service offices will remain at 3372 Central Parkway, Cincinnati 25, Ohio.

★ mms ★

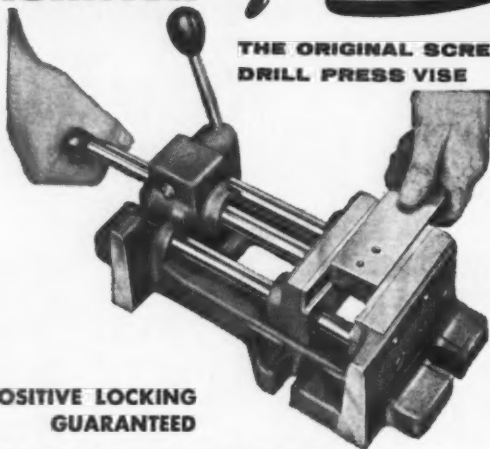
**BESLY-WELLES  
OPENS DETROIT  
BRANCH**

Besly - Welles Corporation of South Beloit, Illinois, announces the opening of a new combination branch office and warehouse at 1150 East Nine Mile Road, Detroit. This completely air - conditioned facility is just one-half mile east of Woodward Avenue.

Comprehensive stocks of taps, X-Press Taps, drills, reamers, end mills, carbides and toolholders are

# heinrich *Grip-Master*

**THE ORIGINAL SCREWLESS  
DRILL PRESS VISE**



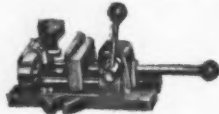
**POSITIVE LOCKING  
GUARANTEED**

Some models have sides precision ground square with jaws for machining from 2 or 3 sides. Jaw widths 3", 4", 6" and 8" . . . from 3" to 9" openings.

**CUT TOOLING COSTS UP TO 75%**



Use the HEINRICH Grip-Master Jig and Fixture Base. Simply add false jaws and bushing plate.



Result . . . an accurate, low-cost Drill Jig.



Send for BIG, FREE 28-page catalog.

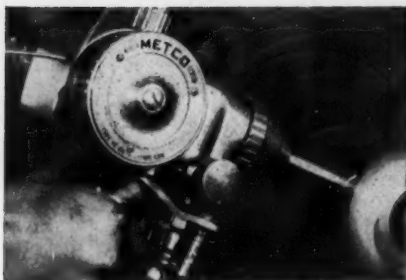
**HEINRICH TOOLS, INC., DEPT. 111-C**

**Racine, Wisconsin**

For more data circle 439 on Postpaid Card



# Complete your shop with this modern metallizing installation



**WIRE GUN**—Sprays any metal that can be drawn into wire form.



**POWDER GUN**—Sprays hard-facing alloys and ceramics in powder form.

Without metallizing, no maintenance or "job" shop can offer the same complete service as the shop that uses industry's low-cost "putting-on" tool.

With modern, low-cost metallizing equipment you can spray carbon steels, stainless, babbitts, brass, bronze, nickel, aluminum, tin, zinc, special hard-facing alloys, including tungsten carbide.

■ Save up to 90% of replacement costs on machine repair jobs ■ Do your own hard-facing at high speed, low cost ■ Apply long-wearing, corrosion-resistant coatings

**A real opportunity for the smaller shop.** Thousands of large, well-known companies and shops have been metallizing users for many years, not only in maintenance work but in production applications on original equipment. Now, with modern low-cost metallizing equipment this high-speed "putting-on" tool is within the reach of even the smallest shop.

## FREE BULLETIN



Send off the coupon for detailed information—find out how a metallizing installation can pay for itself in a very short time. No obligation, of course.

## METCO INC.

FORMERLY METALLIZING ENGINEERING CO., INC.

*Flame Spray Equipment and Supplies*



### METCO INC.

1177 Prospect Ave., Westbury, Long Island, N. Y.  
Please send me free bulletin on metallizing.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

Zone \_\_\_\_\_ State \_\_\_\_\_

For more data circle 440 on Postpaid Card

Gaertner Optical Instrumentation  
designed and manufactured in the U.S.A.



## Coordinate Cathetometers reduce inspection time

Gaertner Coordinate Cathetometers are reliable optical instruments for making precise measurements in the vertical plane. Because they permit reading two coordinates in a single setting, they reduce inspection time and eliminate resetting errors.

In addition to the routine inspection applications, these instruments permit measurements on larger objects as well as objects or points in recessed, remote or inaccessible locations. They eliminate the errors and indecisions associated with mechanical-contact measurements.

Illustrated is Gaertner's M1238-1818 instrument. It has a range of 18" x 18", working distance of 9" to infinity, and reads to 0.001" up to 24" working distance. Protractor ocular reads up to 3 minutes of arc. Larger ranges are available. Smaller types provide reading to 0.0001".

Write for Bulletin 194-57

Use Postpaid Card, Circle No. 441

1275 Wrightwood Ave., Chicago 14, Ill., BU 1-5335

**Gaertner**  
SCIENTIFIC CORPORATION

## news of the industry . . .



Combination Branch Office and Warehouse  
of Besly-Welles Corporation in Detroit

stocked with a unique color-coding system designed for rapid selection and handling.

Besly-Welles also maintains warehouse facilities at Chicago, Los Angeles, Cleveland and Union, New Jersey, in addition to factory stocks at South Beloit, Illinois.

★ modern machine shop ★

## CHICAGO-LATROBE APPOINTS V.P.-G.M.

Chicago-Latrobe, division of United-Greenfield Corporation, Chicago cutting tool manufacturer, announces the appointment of Albert S. Burgoyne as vice president and general manager.

★ modern machine shop ★

## STANDARD HORSE NAIL APPOINTS BOARD CHAIRMAN

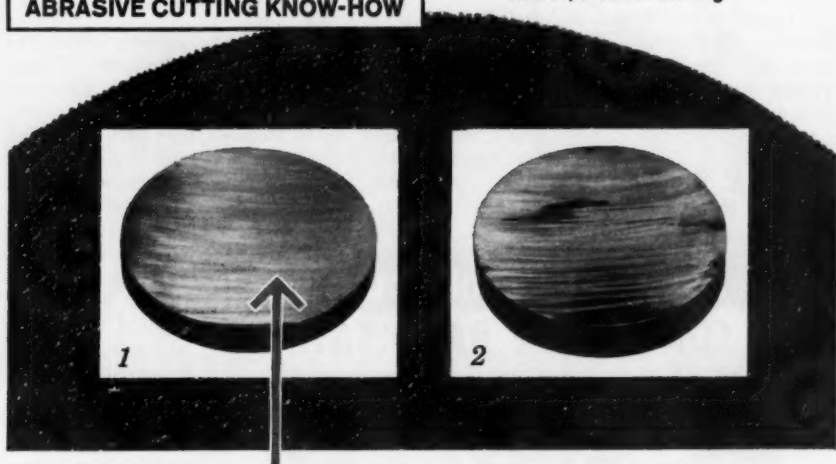
G. Blair Sheers has been elected by the board of directors of Standard Horse Nail Corporation, New Brighton, Pennsylvania, as chairman of the board to replace the late Fred I. Merriker, of Morewood Heights, Pittsburgh, Pennsylvania.

Mr. Sheers has been president for the past 18 years and will continue in

# Allison-Campbell

## ABRASIVE CUTTING KNOW-HOW

Close-up view of resinoid wheel shows rough texture that provides cooler, cleaner cutting

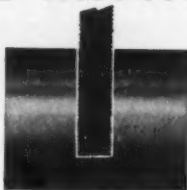


## This CLEAN cut was made with a ROUGH-SIDED wheel!

1•THE SPECIMEN ON THE LEFT ABOVE was cut from a 3¾" diameter hardened steel bar in just 28 seconds with an ALLISON rough-sided dry abrasive cutting wheel like the one shown in the background. Note that the cut is clean and practically burn-free.

2•The specimen on the right was cut under the same conditions and with a wheel of the same formulation, but *without* rough sides. The result — the cut took 30 seconds and produced a badly burned surface.

3•The secret is the extra clearance the rough sides give *inside* the cut. This results in cooler cutting action and added wheel life. That's why, for the dry abrasive cutting of solid bars, heavy-wall tubing and structural shapes, we generally recommend rough-sided wheels. Your problem might be different. An ALLISON-CAMPBELL Field Engineer can recommend the right wheel for *every* cut-off job.



3 Inside the cut, rough sides give extra clearance

Write for Bulletin DH-214A for details on the complete line of ALLISON wheels



# ALLISON ABRASIVE CUTTING WHEELS

Allison-Campbell Division • American Chain & Cable Company, Inc.

931 Connecticut Avenue, Bridgeport 2, Conn.

For more data circle 442 on Postpaid Card

**news of the industry . . .**

this capacity as the active head of the 89 year old corporation. It manufactures all types of machine keys, pins, special steel products and foundry chill nails.

Other officers are R. S. Merrick, vice president, J. D. Brubaker, treasurer and C. K. Kennedy, secretary and assistant treasurer.

**FURNACE PROCESSING PLANT  
OPENED IN SAN ANTONIO  
BY WALL COLMONOY**

A new furnace processing plant has been opened in San Antonio, Texas, by the Stainless Processing Division of Wall Colmonoy Corporation, Detroit. R. L. Peaslee, vice president and general manager of the division, said that the move has been made to meet expanding demands for brazing, bright

annealing and furnace heat treating service in the Southwest. Wall Colmonoy also has plant and office facilities at Houston, Texas.

The new plant houses high production, pit-type furnace facilities which will handle parts up to 28 inches in diameter by 35 inches high. The equipment is instrument controlled and used with pure, dry hydrogen atmosphere and other standard protective furnace atmospheres. The Stainless Processing Division has other brazing and processing facilities in Detroit, Morrisville, Pennsylvania, Montebello, California, and Dayton, Ohio.

Manager of the new plant is L. E.

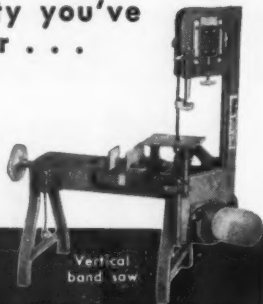
**The New WELLS MODEL 58-B**

**A CONVERTIBLE BAND SAW**

**with the capacity you've  
been looking for . . .**



Horizontal  
cut-off saw



Vertical  
band saw

**COMPACTLY BUILT • MODESTLY PRICED**

Here's the all new Wells Model 58-B . . . a metal saw designed and built for double duty—double value. It's a compact, rugged, well guarded, extremely versatile unit . . . economically priced. As a horizontal cut-off saw, Model 58-B features quick-action vise (swivels to 45°); automatic shut-off; adjustable guides. Capacity: 6" x 10" rectangular shapes; 6" dia. rounds. For vertical use, swing head to upright position and install work table. Optional wheel-handle unit provides complete mobility. Write for complete information.



*The Pioneers of Horizontal*  
**METAL CUTTING  
BAND SAWS**

**WELLS MANUFACTURING CORPORATION**

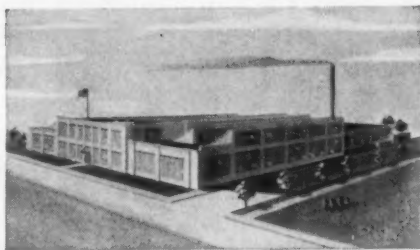
808 Tyler Street, Three Rivers, Michigan

For more data circle 443 on Postpaid Card

**we specialize in**  
**making quality**  
**tools • jigs • fixtures**  
**special machines**  
**machine components**  
**for every**  
**industrial application**  
**quickly economically**

Serving all industries anywhere in the U. S. A. since 1906. A big plant filled with precision production equipment enables us to handle any size job. Write for FREE brochure listing all facilities and capacities.

phone AX. 9-2151



**COLUMBUS DIE-TOOL & MACHINE CO.**  
**P. O. BOX 750 • COLUMBUS, OHIO**

For more data circle 444 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 185

**news of the industry . . .**

McIlvain, who brings to his job 35 years of experience in the metals and metal processing field.

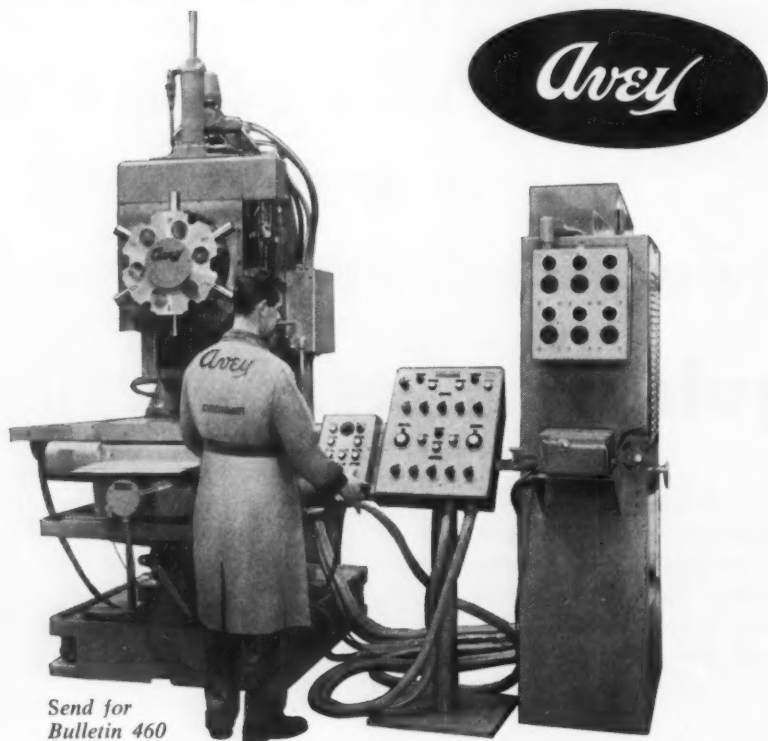
Prior to joining the Stainless Processing Division, Mr. McIlvain had been chief metallurgist at Kelly Air Force Base.

**C. N. CHANDLER BECOMES  
V. P. OF FINANCE FOR  
CRANE PACKING**

Carlton N. Chandler has been appointed vice president of finance for Crane Packing Company, Morton Grove, Illinois (Chicago suburb). Formerly secretary and treasurer, he will continue in the capacity of secre-

---

## 6 precision spindles by



Send for  
Bulletin 460

You can get this rugged Avey 250 Turret-Dex with either automatic or numerical controls. Rotary, 2- or 3-axis positioning. Pre-selected speeds, feeds, rapid advance, tapping cycles. Automatic depth control all spindles; automatic turret clamp; positive spindle stop; skip index. Capacity to 1 1/4". Eight spindles optional. Avey, Box 1264, Cincinnati 1, Ohio.

For more data circle 445 on Postpaid Card



# BORING CRITERION

Criterion makes 26 different models with a boring range of  $\frac{1}{8}$ " to 20".

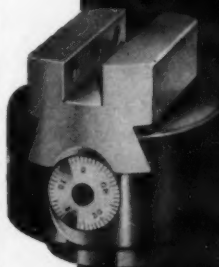
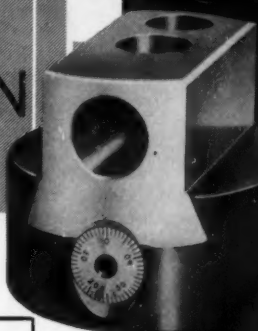
Among those available, you may select tenth-setting heads for extremely close work, square and slotted bar holder heads for special application, and a variety of hole sizes from  $\frac{3}{8}$ " to  $1\frac{1}{2}$ ".

Whatever your requirements, there is a Criterion Boring Head that will do your job.

Shanks and adapters for all standard machines are available at your Criterion dealer. Ask him to show you the complete line of Criterion Boring Heads, shanks, boring, grooving and threading tools.

When choosing your boring equipment look to the name that has consistently stood for the highest quality for the past 25 years.

For more information on Criterion Tool Products, write for free literature or consult the dealer in your area.



# HEADS

CRITERION MACHINE WORKS  
756 W. 16th STREET, COSTA MESA, CALIFORNIA

For more data circle 446 on Postpaid Card

**news of the industry . . .**

tary. He also is treasurer of the firm's Canadian subsidiary, Crane Packing Company, Limited.

A resident of Evanston, Illinois, Mr. Chandler has been with Crane Packing Company since 1944. Simultaneously, Glenn Moore was chosen to fill the position of treasurer. Mr. Moore

was previously controller for the National Gas Cylinder Division of Chemtron Corporation. He is a resident of Winnetka, Illinois.

★ modern machine shop ★

**CLEVELAND TWIST DRILL  
ELECTS DIRECTOR**

The Cleveland Twist Drill Company, located in Cleveland, Ohio, recently announced the election of Louis A. Lincoln to the company's board of directors.

Mr. Lincoln has been a director of Bay State Tap and Die Company, Mansfield, Massachusetts, since 1925 and he has been its president since 1937.

He is a director of the First National Bank of Mansfield.

Bay State Tap and Die Company was incorporated in 1901 and was acquired by the Cleveland Twist Drill Company in 1959 in order to complement its line of cutting tools.

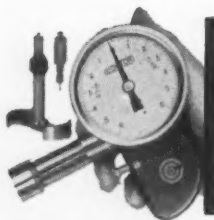
Louis A. Lincoln was graduated from Yale in 1925. His residence is in Sharon, Massachusetts.

*Could an*

## E-X-P-A-N-D-I-N-G PLUG GAGE

*solve a gaging problem for you?*

The Comtorplug expansion principle is unique . . . and proven. Hundreds of U. S. precision-production programs use it, including several of the very largest. The unique expansion plug gives true 2-point gaging. You see actual diameter in a fixed reading to fraction of .0001". You measure front or back taper exactly, also ovality, bell mouth, etc. Centering, alignment and pressure are automatic, allowing accurate use by all types of personnel.



For holes  
1/8" to  
10" dia.

"We've reduced  
rejects since  
using  
Comtorplug"



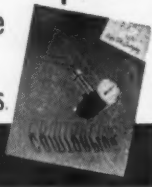
If you produce precision holes in volume

**SEND FOR BULLETIN 50**

COMTOR COMPANY, 64 FARWELL ST., WALTHAM 54, MASS.

**COMTORPLUG**

For more data circle 447 on Postpaid Card



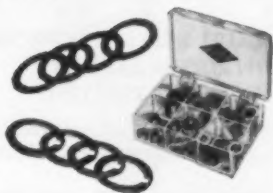
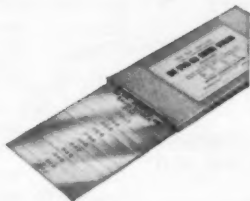


# IT'S A FACT

YOU CAN DEPEND ON



## SPACING PRODUCTS



... Such as FEELER STOCK in coils and strips. Made from tempered stock in accurate thicknesses from .001" to .032".

... Such as precision SHIMSTOCK rolled from selected materials. Free of all burrs and rough edges—packaged in sheets or rolls.

... Such as ARBOR SPACERS, SHIMS, SHOULDER-SCREW SPACERS and SPACING COLLARS—packaged in popular diameters and thicknesses.



### FOR MORE FACTS

WRITE FOR PRICES AND LITERATURE

TOGGLE CLAMPS

SHIMS  
AND SPACERS



STAMPINGS

BLOWER  
HOUSINGS

## DETROIT STAMPING COMPANY

340 MIDLAND AVENUE • DETROIT 3, MICHIGAN

For more data circle 448 on Postpaid Card

news of the industry . . .

**ROGER NEWTON HEALD**

Roger Newton Heald, former president and chairman of the board of The Heald Machine Company, Worcester, Massachusetts, died after a short illness at the age of 64.

Mr. Heald was president from 1931 to 1949 and chairman of the board from 1949 to 1955.

He had been associated with the Heald firm since 1919.

★ modern machine shop ★

**DUAL RESEARCH PROGRAM  
INAUGURATED BY  
GENERAL ELECTRIC**

Separate but interrelated programs of (A) research and development and

(B) design and evaluation have been initiated by the Metallurgical Products Department of General Electric Company, Detroit.


The reorganization was announced by W. A. Reich, manager, Engineering. Dr. E. W. Goliber, appointed manager-Hard Metal Research, will conduct basic research on the chemical, metallurgical and physical aspects of cemented carbide and related materials.

E. J. Weller, named manager-Design and Evaluation Engineering, will be responsible for the design development and evaluation of all Carboloy products.

The advanced state of cemented carbide metallurgy . . . the extensive use of the empirical approach in the past . . . and the increasing need by industry for material exactitude . . . made it necessary to separate and intensify research activities, Mr. Reich said.

Carboloy cemented carbides are used extensively in metal cutting, wood cutting and mining tools because of their unique combination of hardness and strength.

Also, they are used in a large variety of dies, wear parts and components which are subjected to severe wear, heat corrosion and stress. Carboloy products range from 1 mm pen balls to large wire drawing dies and sheet metal rolls.

**USE SAWS?**  
**HACK • BAND • CIRCULAR**  
**KEEP THEM SHARP!**  
Automatically • Economically  
Learn How—Write Today!  
 **WARDWELL Mfg. Co.**  
3803 Ridge Rd., Cleveland 9, O.

For more data circle 449 on Postpaid Card



**SPELLMACO 'SPOTTERS'**

**A matched set of transfer punches  
for toolmakers, machinists and tool cribs**

Used for transferring location of threaded, drilled  
and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for  
long life—.0025 undersize to facilitate use—Black oxide finish.

SET #3-17; 28 punches with indexed stand—sizes  $\frac{1}{32}$ " to  $\frac{1}{2}$ " , by  
 $\frac{1}{4}$ "—plus handy  $\frac{17}{32}$ " size. Length  $4\frac{1}{8}$ ". ONLY \$19.40.

Single sizes available

**R. L. SPELLMAN CO. • URBANA, OHIO**

For more data circle 450 on Postpaid Card

**Eliminate costly reading errors with the**

## **"HELIOS"**

### **DIAL VERNIER CALIPER with built-in DIAL INDICATOR**

**Direct Reading in .001"**

The world famous "HELIOS" Dial Vernier Caliper is hardened, ground and lapped throughout.

**Other features:**

- Thumb roll permits quick and easy operation
- Knurled lock screw
- 100% measuring capacity (outside, inside and depth.)

Available in 5", 6", 8" and 10" capacities in tool steel or stainless steel.

Height Gage Attachment optional.

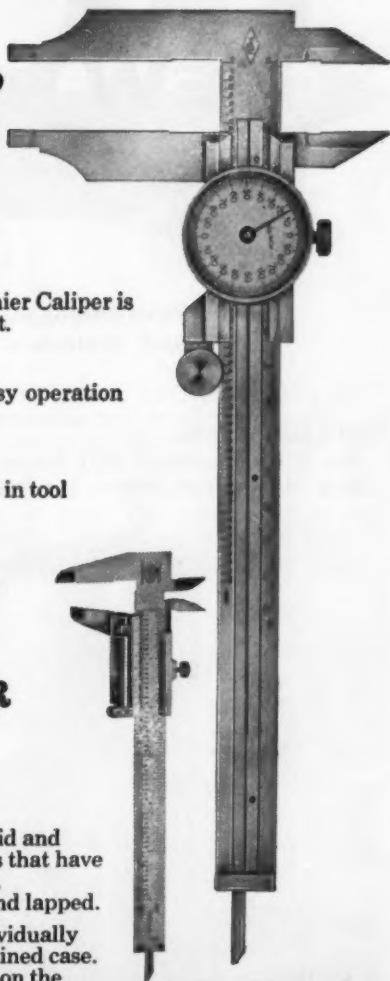
### **"HELIOS" SWING-JAW VERNIER CALIPER**

**with knurled lock screw**

- Direct Reading
- Capacity 4 3/4"
- Length of Jaw 1 1/2"

The swinging jaw allows a very easy, rapid and extremely accurate measurement of parts that have faces which do not lie along the same axis. This caliper is stainless steel, hardened and lapped.

Every "HELIOS" Vernier Caliper is individually packaged in a beautiful hardwood velvet-lined case. Write for detailed information and prices on the "HELIOS" Caliper line.



*Dealer Inquiries Invited!*

U.S. REPRESENTATIVES:

## **M. B. I. EXPORT & IMPORT LTD.**

A DIVISION OF MACHINERY BUILDERS, INC.

475 Grand Concourse, Bronx 51, N. Y.



"Over 25 years' experience in designing and building machinery."

For more data circle 451 on Postpaid Card

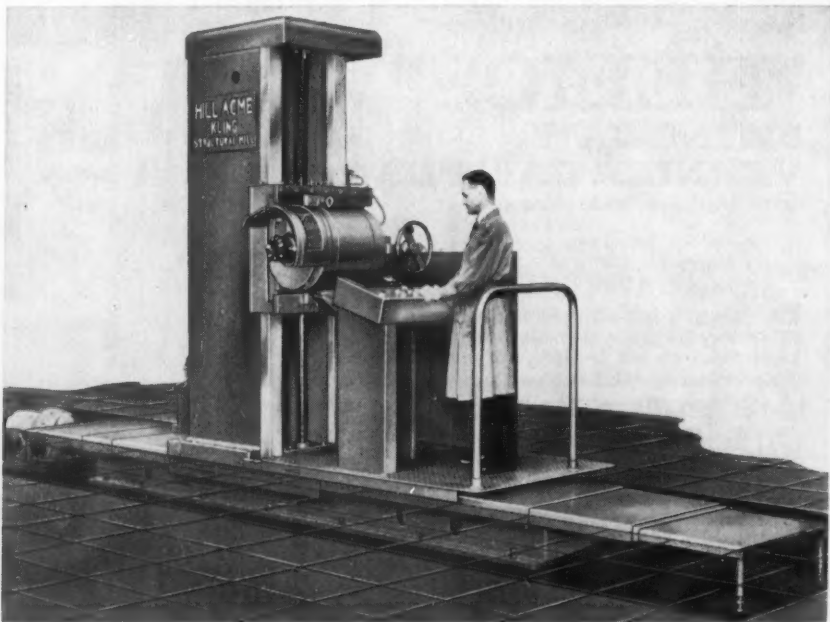
# **NEW** equipment

*Descriptions of new machines, tools  
and materials for metalworking.*

## **STRUCTURAL MILL**

The Kling Structural Mill, for end milling of structural shapes, has been

completely redesigned by The Hill Acme Co., Kling Div., 1201 West 65th St., Cleveland 2, Ohio. The new Struc-



*Hill Acme "Kling" Structural Mill designed for end milling of structural shapes*



# and materials

Edited by L. L. BALDHOFF

tural Mill design insures faster stock removal and more rapid positioning of the working head.

New design features incorporate: ball screw leadscrews, non-metallic precision ground ways, hydraulic counterbalance of the working head, electronic overload protection, hydraulic binders, centralized automatic pressure lubrication and welded steel construction. The machine now weighs 18,250 pounds and has a horizontal travel of 120 inches with a vertical travel of 60 inches. The 40 h.p. direct drive spindle motor affords 10 inches of "in-feed." Either 4½ or 5 inch diameter cutters, with carbide inserts, will feed 30 i.p.m. with a 1½ h.p. motor or 60 i.p.m. with a 3 h.p. motor. For more data circle 115 on Postpaid Card

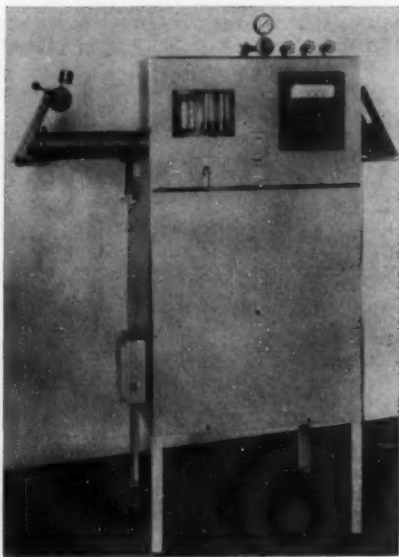
★ modern machine shop ★

## CONTROLLED ATMOSPHERE FURNACES

A line of controlled atmosphere furnaces, designed by Stewart Eng. Corp., Santa Cruz, Calif., utilizes a unique muffle design to provide exceptional rapid heating characteristics and long service life. Stewart Furnaces employ the metal thermal tube itself as the heating element, acting as a resistive load across the secondary of

a heavy duty transformer. The design promotes both rapid heating and quick cooling, enabling reaching a temperature of 1,200 degrees C. in less than 10 minutes and cooling to 80 degrees C. in about the same length of time.

For controlling the atmosphere within the thermal tube, the furnaces



Model 3D-24 Controlled Atmosphere Furnace

## **new equipment . . .**

are equipped with gravity-sealed, counterbalanced sliding doors with mica viewing ports. A fire curtain automatically turns on or off as the doors are operated. Either single or mixed gases or air may be selected for the muffle atmosphere, which can be either dry or humidified. Temperature control is provided automatically with an indicating pyrometer.

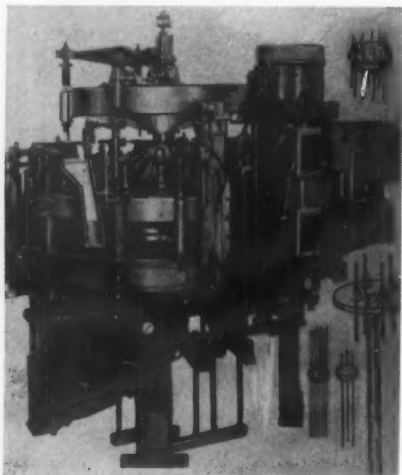
Stewart Controlled Atmosphere Furnaces are supplied ready for operation in complete package units and require only simple connections to water, gas and power. Standard models range from 2 $\frac{7}{8}$  to 5 $\frac{3}{4}$  inch diameter capacity with operation from 220 or 440 volts, single phase current.

For more data circle 116 on Postpaid Card

★ modern machine shop ★

### **24 HEAD BUTTON STEM MACHINE**

The Eisler Eng. Co., Inc., 734 South 13th St., Newark 3, N. J., has placed



Eisler 24 Head Button Stem Machine

on the market an improved and fully automatic high speed 24 head button stem machine. The miniature button stems, as illustrated, are most frequently used in diodes, transistors or miniature electronic tubes.

Precision index is generated from a barrel cam drive, operating in conjunction with roller plate with tapered rollers which are hardened and ground. Drum cam and worm gear speed reducer are located in gear box on underside of table.

Glass is molded in alloy dies which are interchangeable for other sizes of dies within the capacity of the machine.

Two electric motors, each  $\frac{1}{2}$  h.p. capacity for use on 220 volt, 60 cycle, 3 phase are provided. One motor with jog switch and variable speed drive controls the numbered indexed per hour for the turret. The second motor, with variable speed drive, controls the r.p.m. of the die holders.

For more data circle 117 on Postpaid Card

★ modern machine shop ★

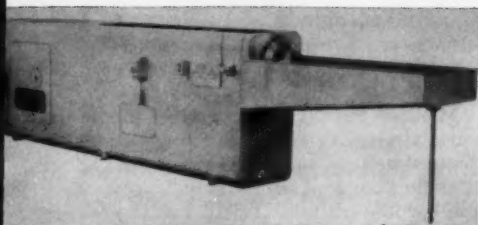
### **HORIZONTAL BROACHING MACHINE**

Pioneer Broach Co., 6434 Telegraph Rd., Los Angeles 22, Calif., announces the Model H 1560 Horizontal Broaching Machine. It was developed in response to numerous requests for an economical, large capacity, heavy duty unit.

The Model H 1560 has a capacity of 15 tons and up to 60 inches of cutting stroke. Fully variable cutting speeds up to 22 and 60 f.p.m. return stroke permit extremely high speed production.

This broach utilizes heavy, rigid, chassis type construction and is fully self-contained in an all steel housing.

All operating and adjustment controls are conveniently located for ease of operation and a minimum of operator fatigue. It is designed for rapid



**Pioneer Model H 1560 Broaching Machine**

setup of either short or long runs requiring high accuracy, and is adaptable for either surface or internal broaching.

For more data circle 118 on Postpaid Card

★ modern machine shop ★

### **MULTI-POINT DRILL GRINDER**

Setup changes in seconds is a major feature of the Multi-Point Drill Grinder, announced by Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Michigan.



**Model DG-1 Multi-Point Drill Grinder**

March, 1961

The Model DG-1 incorporates the principle of conical grinding and grinds both general and special purpose points common with today's numerous super-alloy metals. The wide variety of points which the unit is capable of producing is obtained by simple and rapid adjustments of the  $\frac{1}{8}$  to 1 inch drill holder, furnished as standard.

For more data circle 119 on Postpaid Card

★ modern machine shop ★

### **REAMERS, END MILLS AND MILLING CUTTERS**

Threadwell Tap & Die Co., Greenfield, Mass., recently introduced three complete new lines of cutting tools: high speed reamers, high speed end mills and high speed milling cutters.

Threadwell, a prominent manufacturer of taps, dies, gages and other metalworking equipment, will be able to offer a broader range and greater variety of cutting tools to better serve the metalworking industry.

For more data circle 120 on Postpaid Card

★ modern machine shop ★

### **O.B.I. PUNCH PRESS**

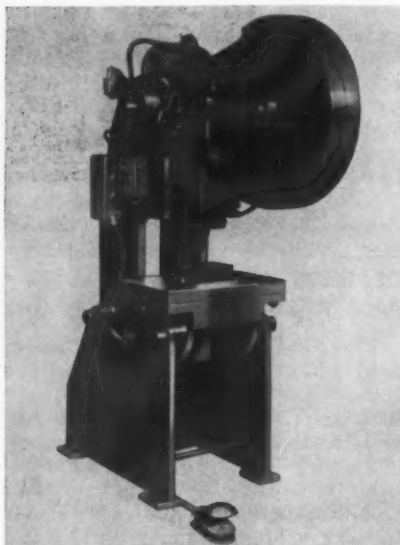
An open back inclinable punch press has joined the line of power punch presses available from Whitney Metal Tool Co., 720 Forbes St., Rockford, Ill. The new press features a 30 ton capacity with 15 percent overload safety factor. The frame is all-steel welded and stress relieved.

The pintype, non-repeat clutch is converted to repeat by turning a switch. The electrically operated press is rated at 120 s.p.m. Opening through back is 12 inches wide with an 8½ inch throat depth and 12½ inch throat height. Frame can be inclined 30 degrees.

Press is operated by a movable foot trip that may be placed where it is

MODERN MACHINE SHOP 195

**new equipment . . .**



**The Whitney-Jensen O.B.I. Punch Press**

most convenient for the operator. Ram is held securely by vee type gibs for positive punch and die alignment. Length of stroke is 3 inches with 2½ inch ram adjustment.

For more data circle 121 on Postpaid Card

★ modern machine shop ★

**LINE OF 17 INCH DRILL PRESSES**

A 17 inch drill press line has been introduced by Rockwell Mfg. Co., Walker-Turner Div., Dept. 1017, 400 North Lexington Ave., Pittsburgh 8, Pa. Features of the line include a new internal depth stop which permits stopping of the pinion at any preset depth within the full 5 inch spindle travel range. A depth gage, calibrated down to 1/16 inch and magnified 2:1 for easy reading, is attached.

According to the manufacturer, this depth stop completely eliminates quill,

spindle and cutting tool deflection. It also does away with hard-to-adjust stop nuts found in external type stop rods.

Walker-Turner is offering 84 model variations to suit a wide range of job requirements. Included are single spindle floor and bench models, multiple spindle units and drill heads with either hand or power feed. These can be used in both high and low speed operations.

Power feed models are equipped with a new type of mechanical feed, permitting one hand engagement for production drilling. They also offer provisions for remote operation which can be interlocked with other units or synchronized with a wide variety of automation devices for semi or fully automatic production operations.

A "front-of-the-machine" convenience provided is a push-button control which has been designed for safety. The start button is shrouded to prevent accidental starts and the stop



**The Walker-Turner 17 Inch Drill Press**

button protrudes for easy access in emergencies.

For more data circle 122 on Postpaid Card

★ modern machine shop ★

### **MAJOR DESIGN CHANGES INCORPORATED INTO DIE CASTING MACHINE**

The Cleveland Automatic Machine Co., 4940 Beech St., Cincinnati 12, Ohio, has incorporated major design changes in its Model 400 Die Casting Machine, which has a strain gage tested locking pressure of 400 tons or better.

The Model 400 has 40½ by 40 inch (vertical and horizontal) size die plates, with 20 by 24 inch space between tie bars. It will accommodate dies having 32 inch maximum and 12 inch minimum thickness, with an adjustable die opening ranging from 6 to 12 inches.

The cast steel toggle mechanism has been positioned to operate in the horizontal plane, to provide maximum accessibility for inserting ejector pins. The movable platen is supported by means of rollers riding on hardened steel plates, to relieve the four tie bars

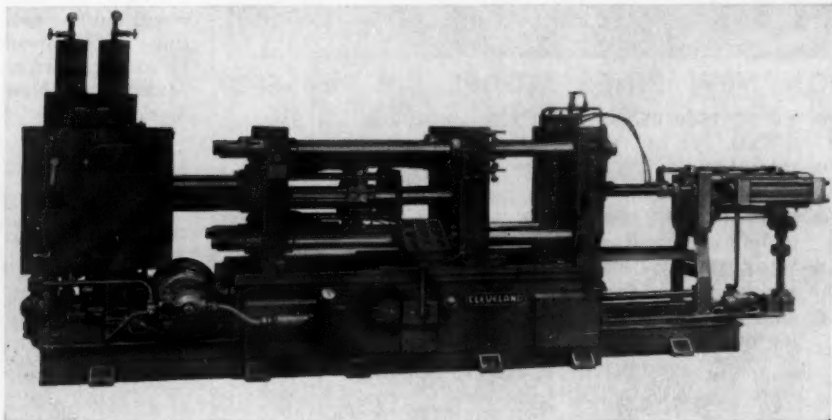
of the weight of the platen and die. Ejector pin holes and platen tee slots follow the S.D.C.E. recommended pattern.

The hydraulic system is built to J.I.C. standards and is virtually leak-proof. The construction uses manifold piping with steel tubing and fittings. All lines 1 inch diameter and over are welded. Die stroke is adjustable by turning a handwheel, located on the center of the die closing cylinder. Length of stroke is indicated by a calibrated scale.

Both the hot and cold chamber shot ends incorporate improved designs. The cold chamber end employs a 4 inch diameter shot cylinder with stroke adjustable from 14 to 18 inches. An intensifier is available which will generate plunger pressures up to 26,000 p.s.i. The hot chamber end includes an improved, 4 inch diameter cast steel shot cylinder having a 7 inch stroke.

The gooseneck supports are cast steel and are designed to permit easy gooseneck adjustments and quick removal. Telescopic tubes are used, which eliminate swivel fittings.

For more data circle 123 on Postpaid Card



**Cleveland 400 Ton Die Casting Machine with cold chamber shot end and intensifier**

**new equipment . . .**

**BRIGHT FINISH,  
RAPID QUENCH OIL**

Shell Oil Co., 50 West 50th St., New York 20, N. Y., announces a new quench oil for ferrous metals, combining maximum surface brightness with rapid quench action. Voluta Oil 921 has shown in recent field and laboratory tests that bright surfaces resulting

from controlled atmosphere heat treatment can be protected during rapid quench.

Voluta Oil 921 offers long service life because it is produced from high grade base stocks having exceptional resistance to oxidation. Protection of the bright finish and cleanliness of carbon and alloy steel surfaces by the new quench oil is attributed to special additives in the oil.

Users of the new bright quench oil are expected to realize important man-

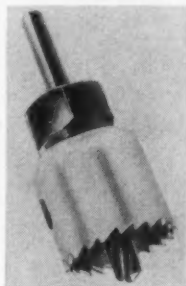
ufacturing economies. In many cases it may be possible to dispense with finishing operations after a rapid quench.

For more data circle  
124 on Postpaid Card

★ m m s ★

**HOLE SAWS**

"Star" Speedi-Cut Hole Saw Blades, featured in sizes from  $\frac{5}{8}$  through 2  $\frac{1}{2}$  inches, have been added to the metal cutting tool line of Clemson Brothers, Inc., Middletown, New York.



*Hole Saw Blade*



**ON NEW PINES MODEL 3-T PRESSES**

- **UP TO 1500 BENDS AN HOUR** on tubular parts up to 1" O.D. — up to 3 times faster than conventional methods.
- **HANDLES UP TO 10 DIFFERENT BEND ANGLES** automatically in a single tooling set-up with accuracy of  $\pm 1/2^\circ$ .
- **FAST 15-MINUTE SET-UPS** with simple, quick-change tooling and pick-out type angle-of-bend stop pins.
- **WIDE-OPEN WORKING CLEARANCES** for rapid progressive bending in varied planes to different angles.
- Other models available for simultaneous multiple bending or with capacities up to 3  $\frac{1}{2}$ " diameter tube.

ASK FOR BENDING PRESS BULLETIN 379

**PINES** ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery 646 WALNUT • AURORA, ILLINOIS

For more data circle 452 on Postpaid Card



# PUSH BUTTON *Speed Selection* from to in seconds

or to *any* intermediate speed, *instantly*



Just push a button and watch the large tachometer dial on the headstock!

It's that easy!

The work is done by a motor driven speed changer. It accelerates or slows the lathe to any desired speed in seconds. With a 10:1 ratio, this new variable drive makes it easy to select from a wide range of speeds—200 to 2000 rpm in direct drive and 40 to 300 rpm in back gear.

Maximum stability and smooth

power transmission are assured because the drive unit is oversized. All pulleys and shafts are fully supported (eight bearings). Double V-belts throughout the drive eliminate slippage and deliver full power to the spindle. Because of this rigidity and extra pulling power, this lathe will take heavy cuts at all speeds and precision finish cuts at high speeds.

It is a precision lathe, moderate in price, with the versatility for toolroom, production or second operation jobs.

## **SHELDON** *Variable Speed* **PRECISION LATHES**



Illustrated  
WM56P  
13" Swing- 34" Centers

*Write for*  
"Variable Speed"  
Circular and General  
Catalog showing . . .

10", 11", 13" and 15"  
**SHELDON**  
Precision Lathes  
(Bench, Pedestal  
and Cabinet types)

13" and 15"  
**SEBASTIAN**  
Geared Head  
Lathes

**SHELDON**  
Milling  
Machines

**SHELDON**  
Back Geared  
Shapers

**SHELDON MACHINE CO., INC.**  
4250 N. Knox Ave. • Chicago 41, ILL.

For more data circle 453 on Postpaid Card

## **new equipment . . .**

Adaptable to electric drills, lathes and drill presses, the new Clemson saw line will penetrate two or more layers of wood, metal, plastic or composition board. Cutting up to  $\frac{7}{8}$  inch deep, holes made with the  $\frac{1}{4}$  inch drill can be extended to  $1\frac{1}{8}$  inches; with the  $\frac{3}{8}$  inch drill to  $1\frac{1}{2}$  inches; and with the  $\frac{1}{2}$  inch drill to  $2\frac{1}{2}$  inches.

The  $\frac{5}{8}$  inch saw features a built-in mandrel, while other sizes are interchangeable with mandrels of various makes. All saws have knock-out holes for quick removal of cores.

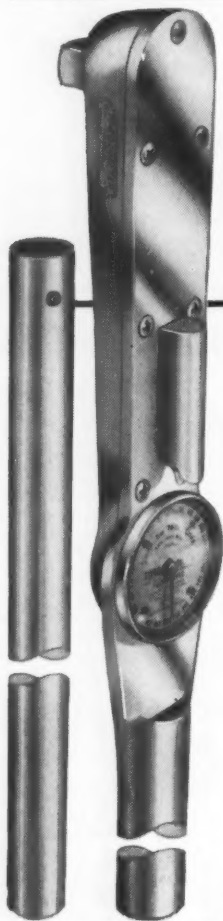
For more data circle 125 on Postpaid Card

★ modern machine shop ★

## **LAPPING MACHINE**

Crane Packing Co., Dept. MO-3, 6418 Oakton St., Morton Grove, Ill.,

announces that its Model 24 Lapmaster features a new abrasive distribution system which maintains the correct mixture of compound to vehicle from initial filling to last drop. It provides adjustable flow control and, through pressure pumping at a constant head, assures uniform deposit at the lapping stations. Pump and tank are mounted on the inside of a door in the machine base. Pneumatic lifts are incorporated as standard equipment to speed up loading and unloading of small and medium size parts. The lifts simplify raising and lowering of conditioning rings and/or pressure plates. The machine incorpo-



***Torquing by "Feel"***  
***can ruin equipment***

# BE RIGHT

with a ***Snap-on***  
**Torqometer®**

Hit bolt tension specs every time—help eliminate mechanical distortion with a SNAP-ON TORQOMETER. Many sizes and models.

There's a fully stocked SNAP-ON branch in most major industrial centers. Check your phone book or write us for complete wrench and hand tool catalog.

FOR ALL INDUSTRY  
**SNAP-ON**  
**TOOLS**

8109-C 28th Avenue • Kenosha, Wis

For more data circle 454 on Postpaid Card

**BRAND  
NEW!**

**SANFORD MG GRINDER  
and DUST COLLECTOR  
in a SINGLE COMPACT  
UNIT**

**MG GRINDER ALSO AVAILABLE FOR  
DRY OR WET GRINDING  
WITHOUT DUST COLLECTOR**

The most widely used precision machine for unit grinding. Famous for its unsurpassed workmanship, quality, and vibration-less operation. The MG is the grinder that's been "copied" but never equaled.

**PARTIAL SPECIFICATIONS**

**GRINDER:** CAPACITY — 8" x 12" x 12". TABLE TRAVEL — 13". TRAVERSE  $8\frac{3}{4}$ ". VERTICAL CLEARANCE — 12" under 7" wheel. STANDARD GRINDING WHEEL — 7" x  $\frac{1}{2}$ " x  $1\frac{1}{4}$ " hole. SPINDLE SPEED — 3000 RPM. MOTOR —  $\frac{1}{2}$  HP, single or 3 phase TEBB dynamically balanced.

FLOOR SPACE — 45" x 38". 62" high on floor stand. NET WEIGHT — 600 lbs.

**DUST COLLECTOR:** BUILT INTO GRINDER FLOOR STAND. EXHAUST CAPACITY—650 CFM. MOTOR —  $\frac{1}{2}$  HP, 3450 RPM, single or 3 phase. NET WEIGHT — 140 lbs.

**A  
COMPLETE  
DUST COLLECTOR  
INCORPORATED INTO  
GRINDER STAND.**

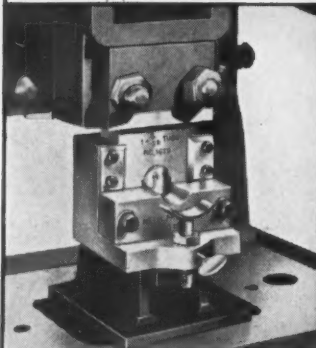
- Exclusive design exhaust hood catches all sparks.
- Can be wired to grinder starter.
- Uses standard size filters—renewable or disposable type, or a combination of both.
- No outside exhaust needed.
- Saves floor space.
- Full size rear door gives access for cleanout.

**SANFORD** MANUFACTURING CORP.  
1022 Commerce Ave., Union, N. J.

For more data circle 455 on Postpaid Card

# Notch 12 PIPE ENDS per MINUTE

Make Perfect Joints for Welding or Brazing



## ARC-FIT

REG. U.S. PAT. OFF.

**NOTCHES CLEAN  
NO FINISHING  
NO DEFORMATION**

Standard ARC-FIT in hand or power press shears contours for "T" joints for 1/2" to 2" pipe or tubing with easily interchangeable dies.

Special ARC-FITS for larger sizes, angles other than 90°, slotting or notching square pipes, angle iron or flat stock.

Send for Descriptive Literature

## VOGEL

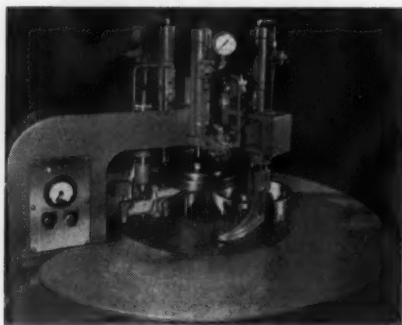
**TOOL & DIE CORPORATION**

1823 N. 32nd AVE., STONE PARK, ILL.

Standard  
Arc-Fit  
works well  
in our  
special  
HAND PRESS



new equipment . . .



The Lapmaster Model 24 Lapping Machine

rates a fast, convenient means for checking and controlling lap plate flatness, insuring absolute uniformity of lapped surface for every piece over an entire production run. A sensing head, manually brought to rest on the lap plate, automatically detects whether lap plate is convex, flat or concave, and registers results through lights on the machine's control panel. A single handwheel then permits simultaneous adjustment of all conditioning rings to compensate for normal wear patterns in the lapping plate.

For more data circle 126 on Postpaid Card

★ modern machine shop ★

## FLOATING AIR PLATFORM FOR JIGS AND FIXTURES

Work can be floated on a "Mighty Midget Flying Carpet" Floating Air Platform, now available from Sperman Metal Specialties, 2199A East 21st St., Brooklyn 29, N. Y. It is a jig and fixture platform that floats work on a thin film of air. This means that heavy jigs or fixtures, weighing up to hundreds of pounds, will be moved around by the operator as if they only weighed ounces. They should be put under any jig or fixture which, when loaded,

For more data circle 456 on Postpaid Card

weighs over 20 pounds. Because the work is floating when the operator lines up the cutting tool with the bushing, the work is aligned more quickly and accurately, cutting tools last longer because they don't chip and there is less work spoilage. The air sweeping out from under the "Flying Carpet" cleans away the chips from the work with virtually no danger from flying chips.

The "Mighty Midget Flying Carpet" Floating Air Platform is an alloy-iron plate, ground parallel and true, with many tiny orifices drilled in the bottom of it. These allow a metered amount of air to flow in a predetermined pattern, lifting the load a few thousandths of an inch above the machine table, even though the table has holes or tee slots in it.

For some classes of work, the "Mighty Midget Flying Carpet" is fastened to the machine table with the



"Flying Carpet" Floating Air Platform

orifices facing up and the work is floated over it.

The "Mighty Midget Flying Carpet" comes in two sizes—6 and 10 inches long; both sizes are  $5\frac{7}{8}$  inches wide by  $1\frac{1}{8}$  inches thick. They can be used in any combination for large work. Each has two screw and two reamer-drill holes for easy fastening. Every "Flying Carpet" comes ready to go to work, with the actuating valve, fittings and 10 feet of flexible plastic hose.

For more data circle 127 on Postpaid Card

## He works better for he SEES BETTER®



For increased production, greater accuracy, fewer accidents and errors, use the MAGNI-FOCUSER—the new 3-D binocular magnifier with matched prismatic lenses. It provides needle-sharp vision—greatly magnified and in third dimension.

Scores of industrial jobs are being aided by the MAGNI-FOCUSER. It reduces eye strain and avoids squinting; leaves both hands free to work. It's light weight; can be worn with or without eye glasses; normal vision resumed simply by raising the head.

Speed your production by ordering now on 10-day trial basis without obligation. Only \$10.50. Immediate delivery. Or write for illustrated folder.

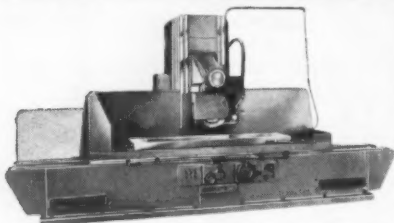
### MAGNI-FOCUSER

EDROY PRODUCTS CO., Dept. P, 480 Lexington Ave., New York, N. Y.

For more data circle 457 on Postpaid Card

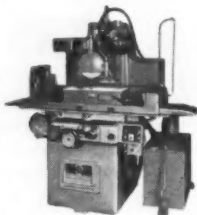
# FOR

## MAXIMUM PRECISION IN TOOLROOM OR PRODUCTION GRINDING



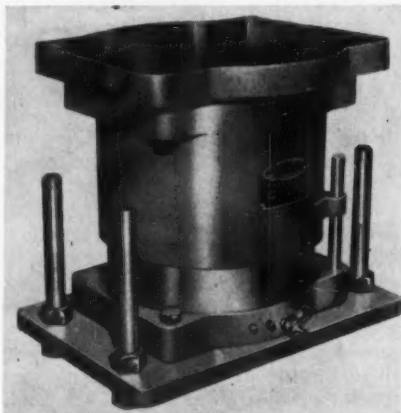
**MODEL F HYDRAULIC FEED SURFACE GRINDER** a production type with cross sliding head, built in sizes ranging from 12" x 18" x 48" to 30" x 25" x 120". Heavy, powerful grinder with maximum table speed of 150' per minute. Motor mounted directly on grinding wheel spindle to assure full power is transmitted directly to wheel. Automatic feeds in increments from .0001" to .001" per reversal available.

**NO. 360 HYDRAULIC FEED SURFACE GRINDER.** A precision toolroom type which offers absolute accuracy with microinch finish at production speeds. One-piece column and base, infinite longitudinal table speeds from 3" to 120' per minute, variable speed cross feed. Available with new incremental downfeed with automatic spark-out after pre-set stock removal.



**NO. 10 UNIVERSAL CUTTER AND TOOL GRINDER** built to meet the need for a high grade machine of medium capacity at a moderate price. Combines rigidity with maximum convenience of operation. Head swivels 360°, locks in any setting; table swivels 90°. Hand operated longitudinal movement. Two spindle speeds.

*new equipment . . .*



**All-Steel Universal Pneumatic Die Cushion**

### UNIVERSAL PNEUMATIC DIE CUSHION

The Dayton Rogers Mfg. Co., Minneapolis 7, Minn., announces a new design and construction of an all-steel, telescoping type, full universal pneumatic die cushion for all power presses.

This Model "MC" Universal Die Cushion will give complete overall ring holding pressure on practically any power press without the requirements of a press bed pit, as the new minimum overall height can be provided for bolster plate mounting or press bed mounting, together with hardened and ground pin pressure pad, custom-made to fit the entire press bed opening. It is furnished complete with combination pressure gage and regulator valve, all necessary

# GRAND RAPIDS

For more data circle 458 on Postpaid Card



fittings—completely engineered to any press requirements, ready to install. For more data circle 128 on Postpaid Card

★ modern machine shop ★

### LEADED ALLOY

A new leaded manganese bronze alloy suitable for high quality screw machine work has been introduced by Ampco Metal, Inc., Box 2004, Milwaukee 1, Wisconsin.

The new alloy—Ampcoloy 668—is a high-strength, free-machining material available in extruded solid and hollow bar forms. Applications for the new alloy include: bushings, bearings, gears, cams, connecting rods, valve stems, lead screw nuts, and so on.

Compared to cast bearing bronzes Ampcoloy 668 offers these advantages: close extruded tolerances reduce machining scrap; no hidden porosity; greater tensile strength (75,000 p.s.i.); decreased weight (8 percent lighter); corrosion resistance superior to copper-tin and copper-tin-lead alloys. Ampcoloy 668 possesses good hot working properties and can be forged if closer size tolerances and higher physical properties are required. In addition, the uniform composition, temper and lead dispersion of Ampcoloy 668 permits duplication of established feeds and speeds and prevents excessive tool wear and breakage.

For more data circle 129 on Postpaid Card

★ modern machine shop ★

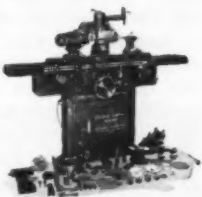
### SMALL MEASURING MACHINE

Mahr Gage Co., Inc., 274 Lafayette St., New York 12, N. Y., announces that eleven different types of interchangeable anvils can be obtained for

# YOU

## CAN FIND THE RIGHT MACHINE FOR YOUR NEEDS ON THESE PAGES

**NO. 60 UNIVERSAL CUTTER AND TOOL GRINDER** offers precision sharpening, fast set-ups and low maintenance. Designed for maximum convenience of operation, with work weight carried directly over base, permitting operator to stand close to work. Master hand wheel provides three speeds of longitudinal table travel.



**NO. 20 HAND FEED SURFACE GRINDER** has hand wheels for vertical and longitudinal table movement to assure toolroom precision and exceptionally fine finish. One-piece column and base, greased-for-life ball bearing spindle. Available with portable, motor driven coolant system.

**NO. 1230 HYDRAULIC FEED O. D. & I. D. GRINDER** meets the needs of users requiring a machine that does both internal and cylindrical grinding. It is a rugged, precision tool capable of taking rough cuts as well as producing the finest finish. Has a host of controls and adjustments for maximum convenience and versatility of operation.



A note on your letterhead will bring full details. Please specify the type of grinder you are most interested in.

**GALLMEYER & LIVINGSTON CO.**

408 Straight Ave., S. W., Grand Rapids, Mich.



# GRINDERS



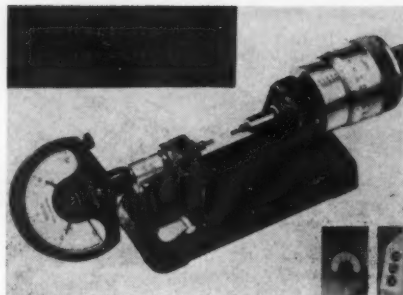
For more data circle 459 on Postpaid Card

## **new equipment . . .**

checking of small precision parts with the Mahr Indicating Bench Micrometer. This feature is most valuable in the quality control of precise parts for the watch and instrument industry, parts of electronic mechanisms and similar small objects. Tapered shank of anvils assures interchangeability within seconds, guaranteeing parallelism between anvil faces.

This small super precision measuring machine, with 1 inch measuring capacity, reads directly in 50 or 20 millionths of an inch, since the comparator head is also interchangeable. The micrometer thimble measures directly by 0.0001 inch. A thumb lever, built into the base, permits rapid retraction of the anvil for inserting and withdrawing the work. Zero adjustment is accomplished by a fine adjustment screw outside of housing of comparator head. Two tolerance hands outside of dial are quickly adjusted to any decided plus and minus tolerance.

For mass inspection, it is recommended to use Mahr Comparator Heads with built-in electric limit contacts, connected to a light signal attachment with three signal lights, which speeds up inspection a great deal. The contact accuracy of the electric contacts is plus or minus 0.000010 inch. Automatic controlling



**The Mahr Indicating Bench Micrometer**

devices may be added by a second socket provided with the signal light box.

For more data circle 130 on Postpaid Card

★ modern machine shop ★

## **BEARING STEELS**

A new family of bearing steels, said to offer improvements in properties over those exhibited by regular 440 C stainless steel, has been announced by Latrobe Steel Company, Latrobe, Pennsylvania.

Exhibiting improved hot hardness properties and better resistance to wear, corrosion and oxidation, these new alloys are modifications of the standard 440 C analysis.

First member of the family, Lesco BG 41, already widely used in high temperature bearings and structural components in jets and missiles, is basically a replacement of 2 percent

## **WJZ "BM" BORE GAGES**



- Direct indicator reading
- Automatic bore centralization
- No heat transmission
- Full indicator travel
- Simplified adjustment
- Easy maintenance
- More economical

### **SPECIFICATIONS:**

MODEL NO.	RANGE	OVERALL LENGTH	PRICE
1 BM	2½ to 4"	7"	85.00
2 BM	4 to 8"	9"	90.00
3 BM	8 to 15"	9"	95.00

Prices are with .0005" indicator. For .0001" indicator add \$17.00. Adjustable Set Master or Master Setting Rings available—prices on request.

**WJZ GAGE AND TOOL CORP., HYDE PARK, N. Y.**

For more data circle 460 on Postpaid Card

chromium in the 440 C analysis with 4 percent molybdenum.

The other members of the family, Lesco BG 42 and BG 43, consist of 1 and 2 percent vanadium, with corresponding higher carbon contents to the BG 41 analysis.

BG 41 is currently produced by air-melting and by the vacuum consumable electrode process. BG 42 and BG 43 are now air-melted, but the company plans vacuum melting also.

The heat treatment of these alloys will develop a final heat treated hardness of Rockwell C 62-64. An oil quench, cold treating at 100 degrees F. and double tempering at 950-1,000 degrees F., is employed. Additionally, an intermediate low temperature temper in the 300-400 degree F. range may be used between the oil quench and the cold treatment in order to minimize the danger of thermal cracking.

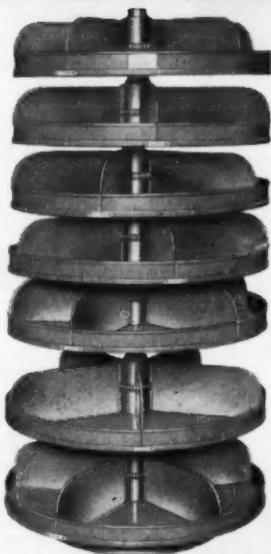
The added volume of vanadium carbide constituent in the Lesco BG 42 and Lesco BG 43 Alloys provides improved wear resistance for these materials. In fact these alloys could easily be considered stainless high speed steels.

For more data circle 131 on Postpaid Card

## BLUEPRINT AND TOOLHOLDER

Kelm Mfg. Co., Route No. 2, Coloma, Mich., has created the Kelm Blueprint and Toolholder to fill a basic need—You cannot simply walk up to a machine and begin production. You need to make use of a variety of tools and instruments, such as drills, end mills, tool bits, micrometers, scales, etcetera, in infinite variety. Invariably you also have to consult either a blueprint, a sketch or a work sheet.

## LYON<sup>®</sup> REVOLVING BINS



**REAL VISIBILITY and  
AVAILABILITY of  
STORED PARTS**

•  
**Save Time and Steps**  
•

Ideal storage for bulk stock, parts, nuts, bolts, screws, etc. 7-shelf unit (illustrated) is 34" diameter x 65-11/16" high. 4-shelf unit is 37-11/16" high.

Each shelf has 5 permanent dividers. Up to 5 additional dividers can be added. Gray baked-enamel finish.

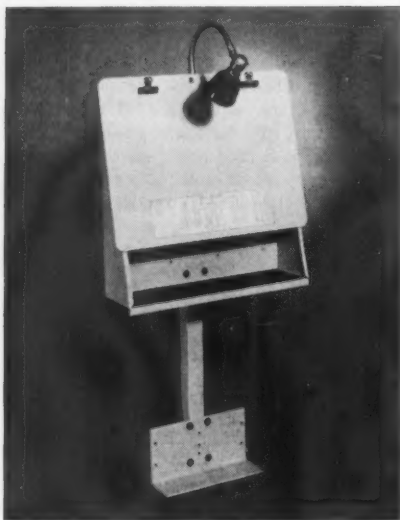
Write for free 100-page Lyon Catalog.

## LYON METAL PRODUCTS, INC.

General Offices: 113 Monroe Ave., Aurora, Illinois  
Factories in Aurora, Ill.—York, Pa.—Los Angeles  
Dealers and Branches in All Principal Cities

For more data circle 461 on Postpaid Card

**new equipment . . .**



**The Kelm Blueprint and Toolholder**

Where to keep all these things conveniently at hand is a problem. The machine designer seldom makes provision for the machine operators convenience, and the employer frequently provides a convenient place for the machinist to hang his hat and coat, then lets him shift for himself when it comes to finding a place for his tools and blueprints.

Orderliness promotes efficiency. Efficiency promotes profits. Orderliness and efficiency can be encouraged by equipping machines with the Kelm Blueprint and Toolholders.

For more data circle 132 on Postpaid Card

★ modern machine shop ★

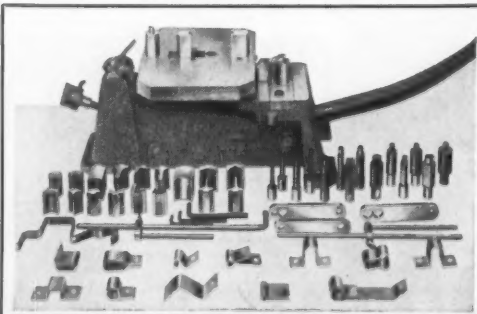
## **ELECTRIC DRIVE CONVERSION UNIT FOR PRESSES**

A low cost electric drive conversion unit, which makes it possible to convert a manual or air driven ACCO or Manley hydraulic press to electrical operation, has been announced by American Chain & Cable Co., Inc., ACCO Equipment Division, York, Pennsylvania.

It was designed for the press user who needs ease of control and the quick response under loads permitted only by an electric drive. Operating from a 110 volt, a.c. power supply, stepless speed control is provided with an easily operated needle valve. Approach speeds are comparable to those of an air drive and response to the control valve under load is almost as fast as the more expensive conventional electric drive.

It is designed with a short duty cycle for the user who occasionally reaches capacity loads.

When coupled with the ACCO screw extension for fast approach to the work, it offers many of the advantages



## **Multiform**

**BENDER CUTTER**

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, and Steel Rule Dies for Metal Blanking.

**AIR OR HAND MODELS FOR UP TO 1/4" to 4" MATERIAL**

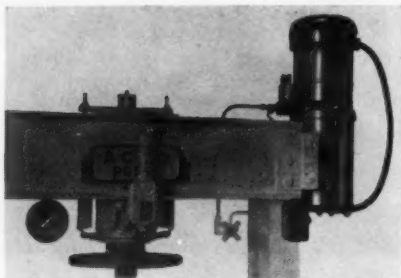
Write for brochure which illustrates and describes the four bender models.

**J. A. RICHARDS CO.**

Dept. 6-M

Kalamazoo, Mich.

For more data circle 462 on Postpaid Card



**E-110 Electric Drive Conversion Unit**

of higher priced electrically driven units.

The ACCO electric conversion unit has all components needed to convert any ACCO or Manley press; a 1/2 h.p. motor, pump, switch, reservoir, control valve, factory preset by-pass, mounting bracket, tubing and installation instructions. The E-110 Electric Conversion Unit can also be mounted on

any hydraulic press that has an external high pressure line.

For more data circle 133 on Postpaid Card

★ modern machine shop ★

### **IMPROVED ELECTRONIC GAGING UNIT**

An improved electronic gaging unit, known as the Electro-Probe, has been announced by Federal Products Corp., 1142 Eddy St., Providence 1, Rhode Island.

Basic components are a small versatile gage head and lightweight, all transistor amplifier-meter which is battery operated. The use of transistors and battery power provides high reliability and instant operation without need for warm-up time. The Electro-Probe is normally powered by a mercury cell battery pack which provides over 1,200 hours of continuous or intermittent operation.



## OPTICAL JIG BORER

- Capacity of coordinate table 6" x 6"
- Setting from master glass scales in .00005"
- Setting of rotary table in 10 seconds
- Spindle head tilts for oblique holes up to 15° from vertical

*Request new 8-page catalog 82-4T*



## **OPTO-METRIC TOOLS, INC.**

**137 MM VARICK STREET, NEW YORK 13, N. Y.**

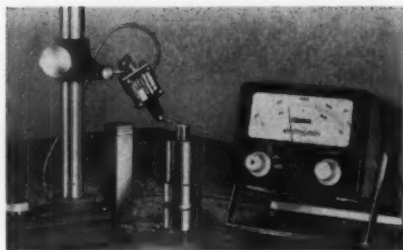
For more data circle 463 on Postpaid Card

## new equipment . . .

All components, including gage head, battery and accessories, are contained within the housing of the amplifier, which is the carrying case of the gage. Carrying handles also serve as adjustable legs so the meter can be set at any angle for easiest viewing.

Any two of six different gaging ranges, from 0.0002 to 0.010 inch, can be combined in the amplifier-meter, providing magnifications up to 11,000x. Scales are correlated and provide minimum graduations from 0.000010 to 0.0005 inch, depending upon the two scales selected.

New design of contact tip automatically compensates for setting contact arm at any angle up to 20 degrees with work, thus eliminating the need to apply correction factors. A new two-speed control for setting zero elec-



Models 230 P-50 and 51 Gaging Units

trically combines rapid long-range approach and closely controlled fine adjustment.

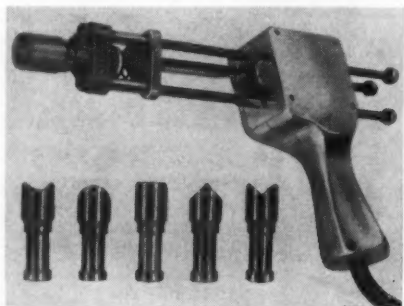
For more data circle 134 on Postpaid Card

★ modern machine shop ★

## "SIX IN ONE" ELECTRIC ARC GUN

Beeco Mfg. Corp., P. O. Box 116, Cranford, N. J., announces an electric arc gun which serves as a spot welder, stud welder, tack welder, button welder, hole burner and riveter.

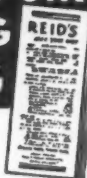
When connected to any a.c. or d.c. welding machine power supply, the Beeco "Six Shooter" will burn a hole in two or more pieces of metal of any gauge or combination of gauges with a sum thickness up to  $\frac{1}{4}$  inch on a single downward thrust of the gun. As hand pressure is released gradually and the spring-return mechanism



Beeco "Six-in-One" Electric Arc Gun

## Every TOOL ROOM NEEDS THIS BIG REID CATALOG

*It's Free!*



88 pages listing 2000 items such as plastic ball handles, malleable machine handles, hand wheels, etc.



### COMPRESSION SPRING ASSORTMENT

Many sizes ranging from  $\frac{3}{32}$ " to  $1\frac{1}{2}$ " dia. Made from music wire. All springs are 10" long. Cut to length desired. Also Extension Spring Assortments.

**REID TOOL SUPPLY CO.**  
MUSKEGON HEIGHTS, MICHIGAN

For more data circle 464 on Postpaid Card



moves the gun up, the rod melts, filling the hole with a strong, sound weld.

Complete arc penetration may produce a hole or a rivet, as desired. A partial arc penetration may produce a stud, spot, tack or button weld, as required. No back-up electrode or welder's helmet is needed to operate because of the design.

For more data circle 135 on Postpaid Card

★ modern machine shop ★

### COMPARATOR SPEEDS TOOL SETTING

To meet an industry demand for a gage to set tool position in adapters ready for use in numerically controlled machines or other machine tools requiring fast and frequent tool changes, Pratt & Whitney Co., Inc., West Hartford 1, Connecticut, has developed the optical tool setting comparator shown herewith.

Primarily used to set tool depth and diameter, the comparator has the added advantage of being capable of checking tool runout and cutting edge condition on any type of cutting tool—whether for numerical or manually controlled machines. The correct tool setting and condition will materially increase machine production time and reduce work spoilage.

The P&W Optical Tool Setting Comparator can handle any type of tool shank—straight or tapered—merely by utilizing an interchangeable

adapter. The instrument is a combination comparator and direct setting device. It uses a set of reliable gage blocks and end measures for even inch settings. Increments of an inch are set by a super-accurate micrometer head. To set the comparator, the gage blocks and/or end measures equal to the nearest inch of length and diameter desired are placed in ground and lapped vees. Tool point positioning is

### SAVE - MONEY - TIME - ENERGY



### LEXCO HYDRAULIC LIFT TABLES

Capacities 500# to 2,000# STD.  
To 10,000# Special

Portable, adjustable height, Hand or Foot Operated. For lifting and transporting heavy castings, dies, etc., to machines and Presses.

Also DIE HANDLERS—STRIP STOCK HANDLERS

**LEXCO** ENGINEERING  
& MFG. CORP.

25 W. Chestnut St. • Souderton, Pa.

For more data circle 465 on Postpaid Card

**REDUCE** Set-up Time and the  
need for expensive jigs & fixtures

### HART MILLING FIXTURES

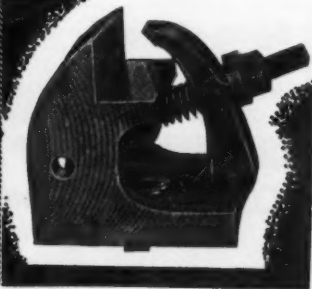
"Masters of A Thousand Set-ups"

Write for  
illustrated  
Folder

Value proved by years of use.

**WALTER W. FIELD & SON, INC.**

39 Hayward St., Cambridge 42, Mass.



For more data circle 466 on Postpaid Card

**new equipment . . .**

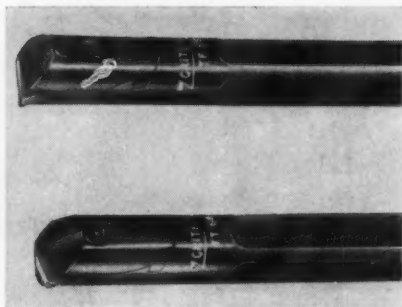


**P & W Optical Tool Setting Comparator**

then observed through the microscope. Exact positioning is made possible by fine micrometer adjustments.

The comparator is sturdily constructed to maintain its high initial accuracy — reading to 0.0001 inch. Cross slides operate on ground and lapped ball ways. This accuracy is feasible since settings are made through a high powered microscope. The head stock spindle rotates freely on precision ball bearings for accuracy and long life. Design and manufacturing methods insure concentricity of the spindle. The comparator should find application wherever machine tools are used. Maximum depth and diameter capacities are 12 and 6 inches, respectively.

For more data circle 136 on Postpaid Card



**Criterion Throw Away Tip Boring Bars**

**BORING BAR FEATURES  
THROW AWAY TIP**

Criterion Machine Works, 756 West 16th St., Costa Mesa, Calif., has introduced a throw-away tip boring bar. These tools are available in two styles, each in six sizes. They range in hole entry size from  $\frac{3}{4}$  to 2 inches, in lengths from 7 to 13 inches. The manufacturer states that at a later date these bars will also be available in shorter lengths for use in the Criterion Boring Heads.

The TF tool uses a precision ground triangular tip and is designed for bottoming and facing. The TT tools are designed for through and general boring and feature the precision ground square tip. Criterion will furnish a general purpose grade of carbide with each bar purchased.

**Spra-Kool**

**MIDGET  
MIST-COOLANT  
GENERATOR**

**\$995**

Complete  
GUARANTEED  
PERFORMANCE

Order Sample or Write for Bulletin

**BAR PRODUCTS CO.**

4803 WHITE OAKS AVE. ROCKFORD, ILL.



For more data circle 467 on Postpaid Card

212 MODERN MACHINE SHOP

**C A M S**

Complete Facilities For

**CAM MILLING and  
CAM GRINDING**

To Your Specifications

**CAM Services Co.**

DIVISION OF HIMOFF MACHINE CO.

23-16 44th ROAD

LONG ISLAND CITY, N. Y.



For more data circle 468 on Postpaid Card

March, 1961

A unique feature is the locking principle that distributes stress over a larger area, thereby preventing the lower half of the bar from receiving the full force of the down thrust. This feature is claimed to assure maximum rigidity.

For more data circle 137 on Postpaid Card

★ modern machine shop ★

### **DRUM, BARREL CRADLE FEATURES HANDLING BAR FOR ONE-MAN OPERATION**

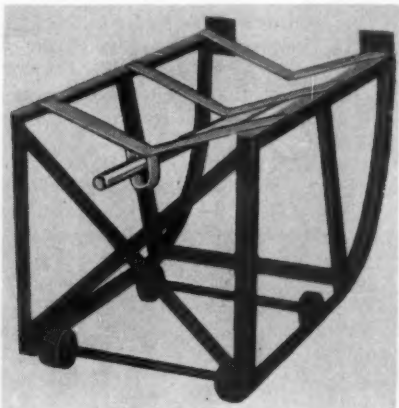
Lexco Eng. & Mfg. Corp., 25 West Chestnut St., Souderton, Pa., has introduced an improved, rugged design to handle heavy drums or barrels with safety, featuring a handling bar which makes it easy for one man to load and unload without assistance.

Units support 15 to 55 gallon drums. Extra strong, 3 inch diameter steel wheels make them portable and easy to move.

Six models are being offered and can be supplied with or without handling bar or wheels.

The model shown has handling bar and four wheels.

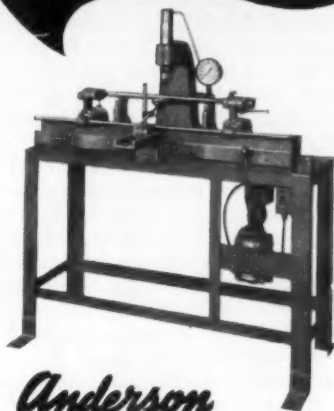
For more data circle 138 on Postpaid Card



View of Lexco Drum and Barrel Cradle

March, 1961

## *Fast...Accurate* **STRAIGHTENING**



### *Anderson* **POWER PRESSES**

#### **Increases Plant Production**

Anderson power presses have solved the problem of manufacturers with straightening, checking, and truing operations that require more than ordinary speed and accuracy.

One plant, for example, showed an increase from (6 to 10) to (30 to 40) by using the Anderson Model HP-004 P 4 ton press shown above.

The full range of Anderson presses (4 to 50 tons) will help you profit from low-cost, high production precision straightening.

#### **Write for Bulletin 5-2**



**ANDERSON BROS.  
MFG. CO.  
Rockford, Ill.**

For more data circle 469 on Postpaid Card

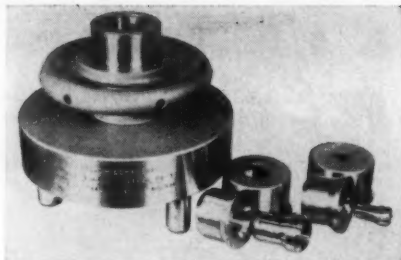
MODERN MACHINE SHOP 213

**new equipment . . .**

### **COLLET CHUCK SPANS SIZE RANGE FROM 1 5/8 TO 1/4 INCH**

A special Model 501 Collet Chuck, that spans the entire range from 1 5/8 to 1/4 inch, is announced by Erickson Tool Co., 34354 Solon Rd., Solon, Ohio. Like the Erickson standard Model 501 Chuck, the special uses standard 500 series collets to cover sizes from 1 5/8 to 1 inch. Two special insert noses, however, extend the capacity by permitting use of standard 400 series and 100 series collets in the size range from 1 down to 1/4 inch. Each collet collapses a full 1/32 inch. Special collets are available in decimal sizes within the 1.625 to 0.218 inch range.

The standard hardened steel collets used in the chuck are slotted at both ends, and employ the Erickson double



**Erickson Special Model 501 Collet Chuck**

angle design. Two camming surfaces collapse the collet over its entire length as the nose piece is drawn in. This enables the collet to grip drills and end mills on their flutes, as well as on straight shanks. The collets are self-releasing.

The special chuck utilizes a hand spinner ring for rapid collet closing and opening. The chuck shown is a quick-change unit with an A.S.S.N. D-1 camlock mounting. It can also be furnished with other mountings.

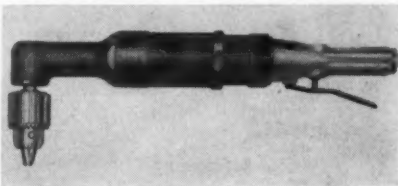
For more data circle 139 on Postpaid Card

★ modern machine shop ★

### **BIG RIGHT ANGLE DRILL**

Largest in a family of air powered, 90 degree angle head drills is the 61A Series, recently developed by Buckeye Tools Corp., P. O. Box 966, Dayton 1, Ohio., for continuous, heavy duty drilling where tool head room is limited.

Available in speeds of 1,000, 700, and 500 r.p.m. and with either a safety



**61A Series 90 Degree Angle Head Drill**

**RIVETERS . . .**

**GRANT**

**PIONEERS and PACEMAKERS in their line**



—head rivets from smallest to 3/4" diameter cold steel, either by NOISELESS SPINNING or VIBRATING HAMMER method—fast, economically—types include Vertical and Horizontal Spindles, foot-power or automatic.

Free estimates of your work.  
Write for catalog today.

**THE GRANT MFG. & MACHINE CO.**  
96 Silliman Ave. Bridgeport 3, Conn.

For more data circle 470 on Postpaid Card

lever or thumb flip throttle, the 61A Series has a maximum capacity of 1/2 inch diameter drill in its six models.

Overall length of the portable tools ranges from 16 to 17 7/8 inches, weighs from 8 1/4 to 9 pounds.

Except for the handle, all-steel construction is used throughout the tools for wear resistance and durability. Spindles, gear and pinion are separately and individually replaceable and are amply supported on ball and needle bearings.

"Quietool" construction permits the tools to be operated with minimum noise at all speeds. Planetary gearing and the angle head may both be externally lubricated without taking the tools apart.

For more data circle 140 on Postpaid Card

★ m m s ★

## DIAL INDICATOR

A super precision dial indicator with accuracy of plus or minus 0.00001 inch has



Starrett Dial-Master

been announced by The L. S. Starrett Co., Dept. MD, Athol, Mass.

The Starrett No. 25-106 Dial-Master Dial Indicator is designed for applications requiring extreme precision, such as shop inspection to laboratory standards or laboratory work. Widely spaced graduations read in 0.00005 inch increments and the dial reading is 0.0015-0-0.0015, with a total range of 0.003 inch.

For more data circle 141 on Postpaid Card

## CRATEX RUBBERIZED ABRASIVES

*Micro-deburring, Smoothing, Cleaning, Polishing*

**Cratex reliability lowers costs**

You can count on every Cratex item to perform just as you expect it to—exactly as the last one did and as the next one will. This is the key to efficiency in micro-deburring, smoothing, cleaning and polishing. **YOU SAVE TIME** because you know just what to expect in performance without experimenting or compensating. **YOU SAVE REJECTS** because with Cratex no unexpected irregularities occur to spoil work pieces.

**WHEELS • POINTS • BLOCKS • STICKS • CONES** in 4 grit textures for power or manual application. Sold through leading industrial supply distributors.

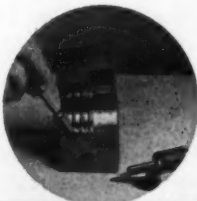
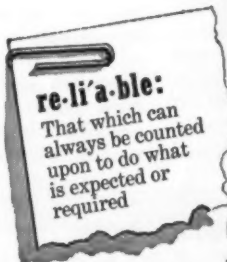
**FREE!** Send for the complete **CRATEX** Industrial Catalog today

## CRATEX

MANUFACTURING COMPANY, INC.

1600 Rollins Road

Burlingame, California



For more data circle 471 on Postpaid Card

**new equipment . . .**

### **PORTABLE ROCKWELL HARDNESS TESTER**

Because it can be fitted with an electromagnetic or chain clamp, the Indentometer (portable hardness tester) can make Rockwell tests in the factory or the field. An hydraulic pressure unit applies a minor load of 10 k.g. and a major load up to 150 k.g. for normal Rockwell testing procedures. Readings are direct in Rockwell A, B or C scales.

Versatility of the Indentometer is obtained by the use of optional electromagnetic (illustrated) or chain clamps. Part size and configuration are not limitations when these clamps are used. The electromagnetic clamp can be applied to flat, as well as to curved surfaces. The chain clamp enables the tester to be mounted



*This Steel City Indentometer is shown here checking hardness of large steel roll.*

against large work, ferrous or non-ferrous, of literally any size. Chain length can be as required.

Standard equipment includes a cone diamond penetrator (120 degree angle with spherical tip), ball penetrator (1/16 inch diameter steel ball), a standard C clamp (5 3/4 inches wide by 5 1/4 inches deep), flat and vee anvils and a test block. The standard clamp can be provided with a quick-release cam mechanism to quickly check identical parts. Weight of the standard instrument is only 18 pounds.

Indentometers are available from Steel City Testing Machines, Inc., 8823 Lyndon Ave., Detroit 38, Mich. For more data circle 142 on Postpaid Card

★ modern machine shop ★

### **AUTOMATIC EXTENDED RANGE RECORDER**

Designed specifically for research and industrial laboratories, the Barber-Colman Automatic Extended Range Recorder, announced by Barber-Colman Co., Wheelco Instruments Div., 114 Loomis St., Rockford, Ill., has capabilities of measuring unknown and widely varying levels of potential. Having from 2-5 automatic steps of zero suppression, the zero is automatically shifted to accommodate any sig-

### **Every Shop Should Own One**



No distortion —  
even on 1/8" stock!  
MODEL "C"

### **KNURLMASTER Hand Knurler**



For small production runs on 1/8" to 1" stock. Exclusive screw design gives perfect knurl pattern. Furnished with 3 hardened straight or diamond pattern knurls of standard 1/2" dia. Forged steel frame is self-centering. Write for illustrated folder.

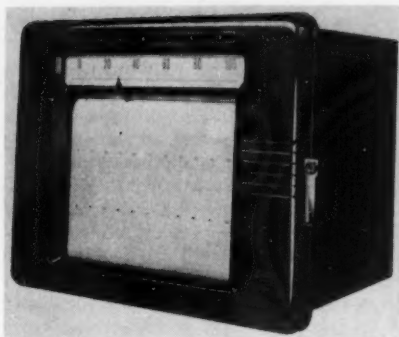
### **ROCKWIN MANUFACTURING CO.**

80-D MAGNOLIA AVE., WESTBURY, L. I., N. Y.  
For more data circle 472 on Postpaid Card

216 MODERN MACHINE SHOP

March, 1961





**Barber-Colman Extended Range Recorder**

nal within a specified range. As the variable exceeds or goes below the span, the scale is automatically extended or contracted. When the zero suppression changes, the span remains the same. It is said that zero suppression does not affect the span.

The recorder is equipped with two pens, the recording pen and the step (marker) pen. The step pen, which is attached at the left of the recording chart, indicates at which step of zero suppression the recorder is operating. Any span from 2 to 250 millivolts may be selected. A total span of 500 millivolts is maximum.

This instrument has an accuracy of  $\frac{1}{4}$  of 1 percent of entire span and a sensitivity of  $\frac{1}{10}$  of 1 percent of each span. A cold junction compensation for thermocouple direct readings is available, if desired. Another feature of this recorder is no loss of accuracy or sensitivity when the recorder automatically shifts ranges.

For more data circle 143 on Postpaid Card

★ modern machine shop ★

#### GUIDE LINE LIGHT

A small model guide line light has been announced by Carter Products

MASTER WORKMANSHIP REQUIRES

# MASTERHEADS

"THE PRECISION HEAD"

BORING · TURNING · RECESSING · UNDERCUTTING · TAPER CUTTING

## WOHLHAUPTER Universal Facing & Boring Heads Feature:



- Automatic Feeds and End Release
- 9 Sizes to 36  $\frac{1}{4}$ "
- 12 Feeds in 0.0008" Increments

Increase the capacity of any machine without facing facilities.

WRITE FOR COMPLETE CATALOG

Sole Agent for U.S.A. **KARL A. NEISE, INC.**  
 Dept. MM, 404 4th Avenue, New York 16, N. Y.—Phone: MU 3-0481

**NEISE**  
MODERN TOOLS

For more data circle 473 on Postpaid Card

**new equipment . . .**



**Models Q-15 and Q-5 Guide Line Lights**

Co., Inc., Helmer Bldg., Grand Rapids 2, Michigan. It casts clear, sharp shadow lines for cutting, marking or assembly operations in small areas or in plants that have low ceilings.

*Peaslee*  
**PRECISION  
MINIATURE** Actual Size

**DOWEL PINS**

We specialize in precision, stainless steel Pins, Dowels, Shafts. Quantity production of standard sizes includes miniature, instrument type pins, as small as .020 dia. For prompt quotations on your blueprints . . .

**WRITE TODAY TO**

**THE PEASLEE METAL PRODUCTS INC.**  
468 Tolland St. • East Hartford 8, Conn.  
For more data circle 474 on Postpaid Card

218 MODERN MACHINE SHOP

This Model Q-5 Guide Line Light, is half the size of the larger Model Q-15. It utilizes a special 500 watt lamp, less than  $\frac{3}{8}$  inch in diameter, which will burn approximately 2,000 hours without forming carbon deposits or otherwise losing efficiency, according to the manufacturer. A special reflector increases the lumen output to give unusually clear marking lines.

The Q-5 light will project any desired number of parallel straight lines in a pattern 8 to 16 inches wide and 4 to 8 feet long. It is ideal for use in plants with low ceilings which prohibit use of the larger guide line light models, or for any operations involving smaller areas to be marked.

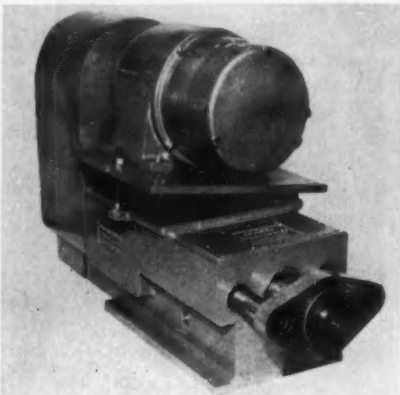
For more data circle 144 on Postpaid Card

★ modern machine shop ★

### **TAPPING UNIT**

A precision heavy duty tapping unit of advanced design and engineering qualities has been announced by Johnson Drill Head Co., Rockford, Illinois.

This compact TU 1400 Unit measures only 32 inches in length, 10 15/16 inches in width and 22 1/2 inches in height and may be supplied with



**Precision Heavy Duty Tapping Unit**

March, 1961

motors up to 10 horsepower. It has a 6 inch maximum spindle travel and can be used in any position, making it ideal for multiple station arrangements on fixed and indexing tables. Built-in electrical relays allow automatic or manual cycling. Each unit is provided with its own control panel and is capable of 30 reversals per minute. It is equipped with oil reservoir tank and a lubricating pump, assuring proper lubrication for longer life. All castings, including the motor housing, are of aluminum alloy.

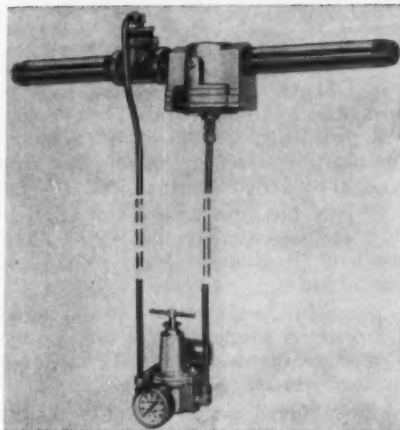
For more data circle 145 on Postpaid Card

★ modern machine shop ★

### AIR PRESSURE REGULATORS

Remote regulation of inaccessible air lines is made possible by the Crown "Pilot Controlled" Regulator, according to Hannifin Co., Dept. 166, 565 South Wolf Rd., Des Plaines, Illinois.

In the "Pilot Controlled" Regulator,



"Pilot Controlled" Air Pressure Regulator

a column of controlled pressure air replaces the adjusting screw and control spring used in standard regulators. This air column applies a constant

### BOREMASTER



For Holes  
and Cores  
in One  
Operation

Bores 6" hole in 3 1/4" Machine Steel in 6 minutes.  
Bores a 5" hole in Boilerplate in 80 seconds.

- Rigid and Heavy-Duty
- Saves Time
- Saves Material (cores intact)
- With or Without Retractable Pilot
- Excellent Chip Load Distribution
- Easy Cutting
- 5 sizes for 1 1/4" to 11 3/4" dia. work to 8" depth



Write for illustrated catalog and learn of the other advantages meaning **HIGHER PROFITS FOR YOU**

Sole U. S. Representative  
**KARL A. NEISE, Inc.**  
Dept. MM, 404 4th Ave., N. Y. 16, N. Y.—Phone: MU 3-0481

ACCURATE  
TREPANNING

THE  
BOREMASTER

NEISE  
MODERN TOOLS

For more data circle 475 on Postpaid Card

### **new equipment . . .**

force on the diaphragm, and is governed by a "pilot" regulator operating at practically "no-flow" to assure prompt response, highest air flow rate and accurate pressure control.

When the line to be controlled is not easily accessible, the "Pilot Controlled" Regulator can be installed out of reach.

Any size regulator having the desired pressure range may be used as the "pilot" regulator, and may be mounted in any convenient location.

The "pilot" regulator can even be installed in a locked box, or in another room so pressure settings will be tamperproof.

For more data circle 146 on Postpaid Card

**HAND TAPPING**  
*with*  
**MACHINE PRECISION**

Adapts for  
**LATHE USE**

**89<sup>50</sup>**

**F. O. B.  
FACTORY**



Just slip a tap adaptor into the Dahlstrom Tap Guide and Twist. Your hand tapping will be quick and accurate. For machine tapping, the spindle top is center-bored to fit the tail stock center of a lathe. Size 18" x 8" x 14". Included 9 adaptors (8-32 to 3/4"). Taps not furnished. Write for pamphlet on Tap Guides, Chucks and Autostops.

BRANCH MFG. CO., 15 Olson Drive, North Branch, Minn.

### **Dahlstrom TAP GUIDE**

For more data circle 476 on Postpaid Card

220 MODERN MACHINE SHOP

### **TEMPERATURE CHAMBER HAS 450 DEGREE RANGE**

Designed for both moderate production and environmental testing, continuous operation or intermittent use, the Sub-Zero Model A-120-2HC temperature chamber shown here, product of Cincinnati Sub Zero Products, 3932 Reading Road, Cincinnati 29, Ohio, affords a temperature range from as low as minus 150 degrees F. to as high as plus 300 degrees F. (plus or minus 2 degrees) with indicating controller.

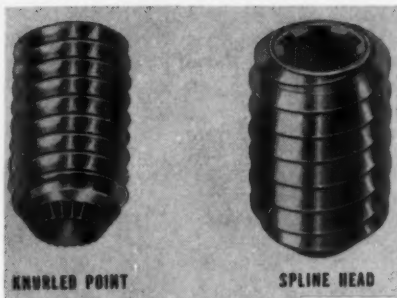
A chamber 24 by 12 by 13 1/2 inches, fin coil and blower, two 2-inch ports and lid with multipane frost-free window make this self-contained unit ideal for job shop or R/D applications. It is mounted on casters for portability. Lifetime silent signal and internal illumination are a few of the features which have been included for safety and convenience.

For more data circle 147 on Postpaid Card



Model A-120-2-HC Temperature Chamber

March, 1961



View shows "Blue Devil" Socket Set Screws

### SOCKET SET SCREWS

New socket set screw "styles" are now available in the Blue Devil line, according to Safety Socket Screw Co., 6519 North Avondale Ave., Chicago 31, Ill. Socket set screws with knurled points are now available in any size

and quantity and spline head set screws in sizes from No. 4 to  $\frac{3}{8}$  inch can be supplied on minimum orders of 5,000 or more in one size.

For more data circle 148 on Postpaid Card

★ modern machine shop ★

### EXTRA LENGTH DRILLS

United-Greenfield Corp., Whitman & Barnes Div., 40600 Plymouth Rd., Plymouth, Mich., announces a complete line of high speed steel extra length drills.

Designed for operations where inaccessibility is a problem or for extremely deep holes, Whitman & Barnes Extra Length Drills are said to perform satisfactorily under the widest range of operating conditions and materials. According to the manufacturer, excellent service can be given on either straight or taper shank styles



Request literature on complete line of Huppert furnaces and ovens.

\* For 2300° F. add \$95.00 to No. 11 and No. 12, and \$105.00 to No. 12A. No. 12A can be furnished for 3 phase at no additional cost. For floor model add \$52.00 to above prices. No. 869 standardly supplied for 2200° F.

Be sure of Maximum  
Heat Treating Efficiency  
with

### HUPPERT FURNACES

- Range: 300° F. to 2000° F.
- High temperature, heavy-duty Kanthal elements
- Multi-insulation
- Counter-weighted, tight-sealing door
- Operational pilot light
- Shipped ready to operate

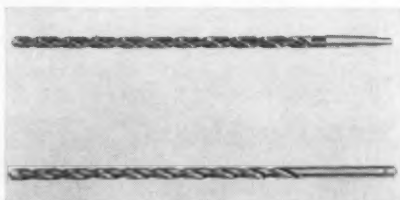
Model No.	Inside Dimensions			KW	Prices 220 Volt Single Phase	
	Wide	High	Deep		With Huppert Input Controller	With Electronic Temp. Controller
869	8"	6"	9"	4	\$296.00	\$480.00
11*	8"	6"	12"	4	306.00	518.00
12*	8"	8"	12"	6	382.00	590.00
12A*	8"	8"	18"	9	490.00	698.00

**K. H. HUPPERT CO.**  
Manufacturers of Electric Furnaces and Ovens

6841 Cottage Grove Ave., Chicago 37, Illinois

For more data circle 477 on Postpaid Card

**new equipment . . .**



**High Speed Steel Extra Length Drills**

and in wire gage or fractional sizes. Diameters range from No. 52 wire gage to 1½ inches, overall lengths to 23½ inches. Larger diameters and longer lengths can also be furnished.

For more data circle 149 on Postpaid Card

★ modern machine shop ★

### ARBOR PIERCING UNITS

Piercing units for use in the Vogel Compact Air Press provide a wide variation of application with a minimum of required parts, according to Vogel Tool & Die Corp., 1823 North 32nd Ave., Stone Park, Illinois.

Circled area of the illustration shows the piercing unit mounted in place ready to receive 1 inch outside diameter tubing. (Press shown also accommodates the Vogel Arc-Fit and V-Notcher.)

These piercing units are available for perforating tubing, pipe, moulding, flat stock, angle iron, channel, etcetera. Punch and die assemblies can be furnished for round, slot, oval, square or various other type openings.

Components required for operation include one arbor holding block, one

## THIS 5 TON OBI PRESS-RITE CAN SAVE YOU BIG MONEY!



In fast production, with 50% less die wear, low operating costs.

In features. Large press extras like exclusive dual spring clutch and special "C" frame design . . . at no extra cost.

For the full money-saving details write . . .

### HAVIR MANUFACTURING CO.

434 Cleveland Ave. • St. Paul, Minnesota

For more data circle 478 on Postpaid Card







**Vogel Arbor Piercing Unit mounted in press**  
arbor with perforating die bushing for each diameter (arbors, bushings and

perforator are interchangeable for different diameters), one tube rest to fit o.d. of tube, one  $\frac{3}{8}$  and/or  $\frac{1}{2}$  inch punch adapter and the perforating punch for desired size.

For more data circle 150 on Postpaid Card

★ modern machine shop ★

### **LIVE CENTER PROVIDES FOR EXCESSIVE THRUST WITH DOUBLE ROW OF BALL BEARINGS**

Excessive thrust loads are provided for in a new model live center, designed and manufactured by Sturdimatic Tool Co., 3900 F St., Detroit 16, Mich., with a flush ground tandem ball bearing—giving double thrust capacity. A double row of radial bearings is also included in its design.

Points are made of chrome nickel alloy steel, hardened and ground true with the bearings. Standard sizes are No. 3 to 6 taper inclusive. Sturdimatic





**Clipper  
Diamond  
Products**

Literature sent on request.

**CLIPPER DIAMOND TOOL CO., INC.**

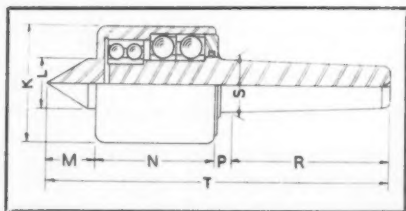
345 Hudson Street, New York 14, N. Y.



Clipper can offer today the most complete line in our history of diamond tools (including special applications), diamond drills and diamond wheels . . . using Natural, Man-Made or SND diamonds, with improved bonds in Resin, Metal or exclusive Ceramet (vitrified).

For more data circle 479 on Postpaid Card

**new equipment . . .**



Drawing shows Sturdimatic Live Center

Live Centers are also available in Jarno, Brown & Sharpe and straight shanks.

For more data circle 151 on Postpaid Card

★ modern machine shop ★

**LIGHT DUTY, AIR-HYDRAULIC OPERATED TOGGLE CLAMPS**

Designed for use in hard-to-reach areas and for rapid sequence of assembly operation

on light jobs in everything from plastic to metal-working, a series of air or hydraulic - operated toggle clamps has been added to the line of De-Sta-Co Clamps, manufactured by the Detroit Stamping Co., 350 Midland Ave., Detroit 3, Michigan. These clamps feature over - center toggle locks that eliminate bounce or recoil and can be used individually, in series, sequentially or simultaneously. They are work-rated with holding pressures to 450 pounds at 80 pounds line pressure.

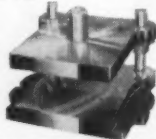
The series is made up of three models, each weighing 1 pound, 10 ounces and provides clamping pressures to 350 pounds. Precision pivot pins, matched to burnished



George always tells the truth, you know. And metalworking men everywhere agree there's nothing to match the lasting accuracy of a Danly Die Set. This accuracy is built in by Danly's precision production methods. And it *stays* in! Even after millions of strokes, Danly Die Sets retain their precision alignment for positive closure accuracy. For you, this long lasting precision means longer die life, lower tool costs and better stampings—even on longest production runs.



NEW descriptive literature on PRECISION PILOT GUIDE POSTS tells how this latest Danly improvement can smooth your die set operation. Write for your copy.



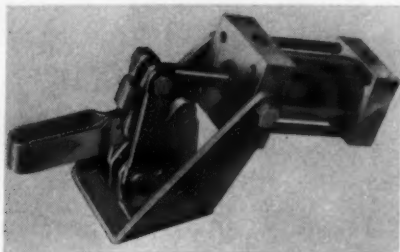
PRECISION PRESSES, DIE SETS AND DIEMAKERS' SUPPLIES

**DANLY**

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Ave., Chicago 50, Illinois

For more data circle 480 on Postpaid Card



**De-Sta-Co Light Duty Toggle Clamp**

holes, insure lasting, accurate operation. Model 807-L has a solid bar and is supplied with a spindle retainer. Model 807-U has a standard "U" bar and Model 807-UL a long "U" bar.

The cylinders on the 807 Series are double acting with  $1\frac{1}{8}$  bore and  $1\frac{7}{8}$  stroke. Each has square aluminum

heads with restrictor ports, brass barrel, block vee packing and stainless steel piston rod with rod wiper. They provide operating pressures up to 150 p.s.i. air, 250 p.s.i. oil.

For more data circle 152 on Postpaid Card

★ modern machine shop ★

### **LIGHTWEIGHT, PNEUMATIC NIBBLERS**

Newage Industries, Inc., 222 York Rd., Jenkintown 26, Pa., announces the availability of Desoutter compact pneumatic nibblers. These portable tools have a capacity of 0.064 inch in steel, weigh only 3 pounds and cut at the rate of 6 f.p.m.; turning radius of 1 inch.

Desoutter Nibblers are intended for intricate contour cutting where size

## **FRICION CUTTING**

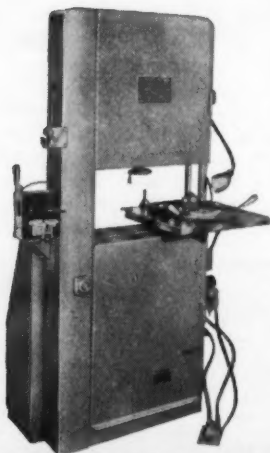
**Can Save YOU  
Hours and Dollars . . .**

*Connecticut*

**friction BAND SAWS  
offer these advantages:**

- Conventional saw cutting and friction cutting on the same machine.
- Especially valuable to fabricators of stainless steel and tough, heat resistant, materials.
- Better guides, more accurate cutting, longer blade life.
- Reasonably priced, selected features tailored to your requirements.

**Write for a Detailed Brochure**



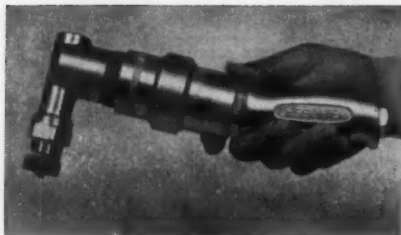
**W. WHITNEY STUECK Inc.**

**1 CONNECTICUT AVENUE  
OLD SAYBROOK, CONN., U.S.A.**

For more data circle 481 on Postpaid Card

**new equipment . . .**

and shape of the work prohibits use of stationary cutting tools. In this case, the portable nibbler is brought directly to the job where a hole is drilled, and the cutting gets under way. The tools are designed to permit cutting of any shape and pattern, even in the center of a metal sheet. A clean cut 7/32 inch



**Desoutter Portable Pneumatic Nibbler**

wide is attainable without burring or deforming the sheet, and the nibblers will cut to within 3/8 inch of a template. For more data circle 153 on Postpaid Card

★ modern machine shop ★

**CHEMICAL WORKER'S GOGGLE  
ALSO DESIGNED FOR CHIPPERS  
AND WELDERS**

A chemical worker's goggle has been announced by Bausch & Lomb, Inc., Safety Products Dept., 893 St. Paul St., Rochester 2, N. Y. It is made of molded rubber in forest green color and is designed to be worn by welders and chippers, as well as those working with chemicals.

Acid resistant, this latest B&L safety product has soft-rolled edges, is completely comfortable, yet fits the face securely. The goggle features a large lens size, S-7 shape, providing wide-angle vision, and will fit over any modern eyeglass frame with ease.



**CONTINUOUS HINGES**

Manufactured by

**AUTO MOULDING  
& MFG. CO.**

WRITE FOR CATALOG

1114 E. 87TH ST.      CHICAGO 19

For more data circle 482 on Postpaid Card

*You Need an Extra Hand Now  
to Speed Up Production!*

**HEIMANN TRANSFER SCREW SETS**




IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

**HEIMANN MFG. CO. • URBANA, OHIO**

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

For more data circle 483 on Postpaid Card



**Bauch & Lomb's Chemical Worker's Goggle**

Available either with aluminum, non-corrosive vents (for welders and chip-pers) or without (for chemical workers), the new goggle is easy to handle, easy to wear and easy to keep clean. For more data circle 154 on Postpaid Card

★ modern machine shop ★

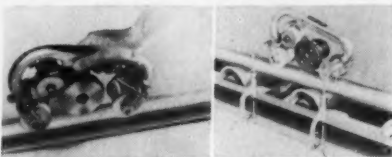
### MILLING TABLE FOR DRILL PRESSES

To utilize the exceptional torque developed by its geared head drill

presses, Boice-Crane Co., 937 West Central Ave., Toledo 6, Ohio, is offering a practical compound milling table accessory for operations involving end mills up to 1/2 inch in diameter and jig boring requiring medium accuracy.

When the frequency of jobs and size of the tools demands, in addition to the milling table accessory, Boice-Crane's geared head drill presses can be fitted with a special type of milling

### BAR and TUBE PRINTER for hand or conveyor use



Rolled by hand along rounds or flats, or mounted over conveyor rolls, this printer provides simple, economical identification code printing. Guide rolls adjust and center printing wheel for clear marking on metal or plastic 1/4" diameter up.

Wheel accepts E-Z Set rubber type in single type characters or complete legend in one strip. Easily pressed into place, or stripped off for quick change.

Sponge rubber ink roll holds enough ink for 8 hours; easily interchanged for color code change.

Lightweight magnesium frame, rugged construction; weight 7 1/2 lbs. Write for literature, Model T-55.

### PANNIER MASTER MARKERS

303 Pannier Bldg., Pittsburgh 12, Pa.

For more data circle 484 on Postpaid Card

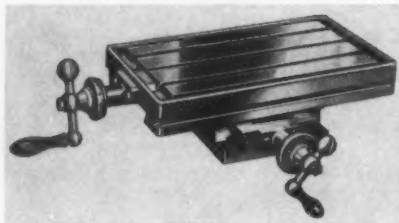


**Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.**

**Write for sample on company letterhead**  
**THE DYKEM COMPANY**  
**2301F North 11th St. • St. Louis 6, Mo.**

For more data circle 485 on Postpaid Card

## **new equipment . . .**



**Milling Table for Boice-Crane Drill Presses**

spindle with threaded nose and screw-on collar.

The milling table has accurately ground work surface size  $22\frac{1}{2}$  by  $9\frac{1}{2}$  inches, fitted with two tee slots, perimeter coolant trough and a third tee slot in the front vertical table surface.

Longitudinal feed is  $14\frac{3}{4}$  inches, cross feed is  $6\frac{1}{2}$  inches. The longitu-

dinal and cross slide saddles are scraped, fitting with both gib adjustments and adjustable stops. Overall height is  $4\frac{5}{16}$  inches.

Lead screws have ball bearing, machine tool type ballcrank handles, scaled for easy reading in 0.001 inch increments.

The milling table can be used interchangeably on Boice-Crane 18, 24 and  $25\frac{1}{2}$  inch geared head drill presses, and adapts to any press with table-knee bored  $2\frac{3}{8}$  inches.

For more data circle 155 on Postpaid Card

★ modern machine shop ★

## **1/4 HORSEPOWER SPRAY OUTFIT**

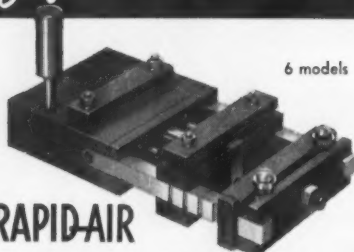
A sturdy, efficient, low price Speedy Sprayer for professional or hobby use, is introduced by W. R. Brown Corp., Chicago 35, Illinois.

The direct drive No. 680 outfit includes the gun. It thoroughly atomizes almost any material including paints, calcimine and insecticides. It develops 25 pounds of working pressure with any  $\frac{1}{4}$  h.p. motor with  $\frac{1}{2}$  inch shaft. Oversize diaphragm insures clean, oil-free air. No lubrication is needed.

The unit is light, compact and portable. It comes complete with No. 212 Gun, 10 foot hose and tire chuck.

For more data circle 156 on Postpaid Card

## **New! PUNCH PRESS FEEDS**



6 models

## **RAPID-AIR**

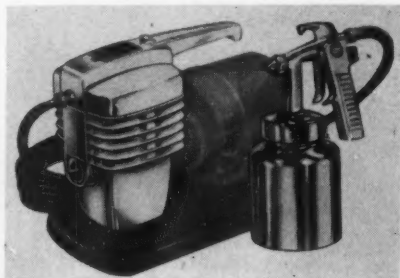
**Speeds your production**  
**Compact—Fast—Accurate!**



Rapid-Air press feeds are self-contained air operated, high speed units for feeding coil stock up to 6" wide. Easy to set up, unit mounts on die set or bolster. Write for bulletin.

**MECHANICAL TOOL & ENGINEERING CO.**  
2323 TWENTY-THIRD AVENUE, ROCKFORD, ILLINOIS

For more data circle 486 on Postpaid Card



**W. R. Brown  $\frac{1}{4}$  h.p. "Speedy Sprayer"**





New packaging for Bay State Grinding Wheels

**NEW PACKAGING  
SIMPLIFIES INVENTORY,  
ADDS CONVENIENCE**

A new type of package has been developed for its internal and other

small grinding wheels by the Bay State Abrasive Products Co., West-boro, Massachusetts.

The new package, part of an overall new system of packaging Bay State products, is more convenient for storage, inventory and use.

The new package is a clear plastic tube capped at each end for easy removal of the grinding wheels. Inventory control is simplified because the number of remaining grinding wheels can be seen at a glance.

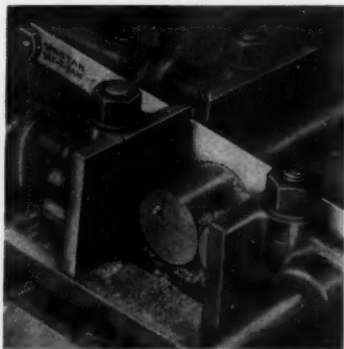
With no saw-dust to remove, the grinding wheels are always ready for use.

The packaging materials provide better protection from dirt and breakage during transit and storage.

In addition, the wheels are pre-packaged in quantities that make logical units of supply for the different grinding operations.

For more data circle 157 on Postpaid Card

## GOOD THINGS BEGIN TO HAPPEN



**There's a SPARTAN  
Distributor near you  
ready to serve**

When You Put A

*Spartan*

**On Your Machine**

Here is a safety saw that will cut everything expected of a power hack saw blade, and just a bit more.

A three-piece welded edge power blade, flexible; and is shatter proof.

Hundreds of plants are getting results that SATISFY. Give them a trial today.

Write for Hacksaw Bulletin S-T. It May Help You.

**SPARTAN SAW WORKS, INC.**

**SPRINGFIELD, MASS.**

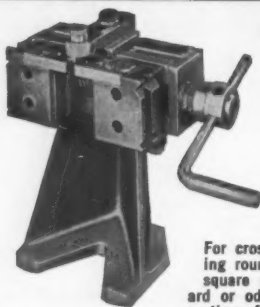
For more data circle 487 on Postpaid Card

**new equipment . . .**

### **CABINET BENCH IS PORTABLE, CONVENIENT AND VERSATILE**

A portable cabinet bench has been designed by American Metal Works, Inc., Bay Products Div., 1827 West Cambria St., Philadelphia 32, Pa., for convenient, on-the-spot maintenance

### **SPEED UP DRILLING & TAPPING JOBS!**



### **JOHN'S DRILL JIG Self Centering**

For cross or end drilling round, hexagon, or square stock or standard or odd-shaped rough castings from  $\frac{1}{8}$ " to 8"

O.D. Will cut tooling and production costs to minimum for 10 to 100,000 pieces. Standard removable slip fit bushings and holders available to drill center or mean off-center. The self-centering action will hold within .0015" or better regardless of jig wear or piece part O.D. variation. Jigs available in three sizes 6", 8", 14"; jaw openings 2", 3 $\frac{1}{4}$ ", 7 $\frac{1}{2}$ ".

Write for complete information

### **HEUSER MANUFACTURING CO.**

1640 N. Paulina St. Chicago 22, Ill.

For more data circle 488 on Postpaid Card



View shows the Bay Portable Cabinet Bench

and repair work. Top surface is extra heavy steel on which a vise or small machine can be mounted.

Lower cabinet is 36 by 24 by 28 inches high with adjustable center shelf. Double swinging doors with locking handle protect equipment stored inside.

Entire unit is mounted on ball bearing swivel casters with wheel brakes so that it can be easily moved wherever required and then locked in position.

Tubular handle is supplied on each end for convenience in steering. Entire unit is finished in very durable gray baked enamel.

For more data circle 158 on Postpaid Card

## **Air-O-chek**

The Nozzle Valve with the internal fulcrum lever

Available in two models and many sizes

**AIR-WAY**



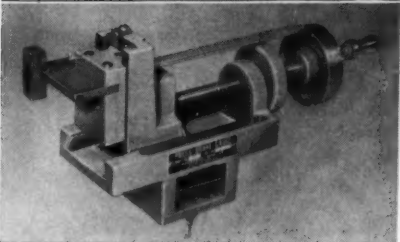
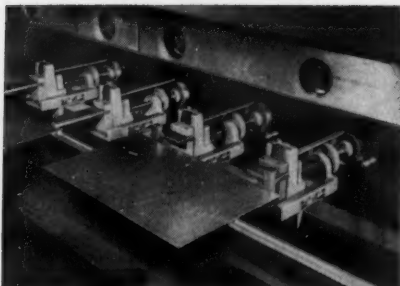
## **AIR ECONOMY**

SAVE through superior performance, low maintenance, low initial cost. Air-O-chek air guns are of simple design, sturdy construction, and are easy to use.

Write for details

**AIR-WAY PUMP & EQUIPMENT CO.**  
1046 N. Kilbourn Ave., Chicago 51, Ill.

For more data circle 489 on Postpaid Card



The Addresso Model 800 Press Brake Gauge

### PRESS BRAKE GAGE

Addresso Mfg. Co., 9105 West King St., Franklin Park, Ill., has developed a press brake gauge, called Model 800, with many features for safer and faster setup and production. The company states it has been found in actual time studies that it will save 75 percent of setup time.

Horizontal adjustment is made by handwheel at the rear; readings from 0 to 3½ inches are made on scale on

right side of Unit. Locknut (wheel) locks reading. For fine adjustment, locknut is released and micrometer adjustment in graduations of 0.001 inch are made by turning handwheel, then setting is again made firm by locknut.

Vertical adjustment, to compensate for die height, is made by raising or lowering front casting to desired height and locking with set screw. In



**OFFSET BORING HEADS**



UNPARALLELED

- ACCURACY
- RIGIDITY
- SIMPLICITY
- DURABILITY

REPEAT TO .0001" IN 30 SECONDS WITHOUT BACKLASH! CAN BE ADAPTED TO FIT ANY MACHINE

100% GUARANTEED! WRITE FOR CATALOG!

**PRECISION**

PRECISION TOOL & MFG. CO. OF ILLINOIS  
1305 SOUTH LARAMIE AVE., CICERO 50, ILL.

MM531

For more data circle 490 on Postpaid Card

# COUNTERBORES

## IN DECIMAL SIZES

**WHY BUY SPECIALS?**





**WRITE FOR FREE CATALOG**

**← TWENTIETH CENTURY MFG. CO.**

**LIBERTYVILLE, ILLINOIS**

BOX 429-MM

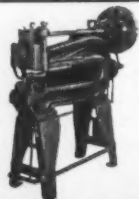
For more data circle 491 on Postpaid Card

## SAVAGE

### NIBBLING MACHINES

- Sheet Metal Cutters
- Roller-Die Type Best for Cutting Stainless Steel
- No Sparks • No Oxidation
- No Secondary Operations
- No Open Flame
- Speed • Safety

DEALERS IN MAJOR CITIES  
WRITE FOR BULLETIN "K"



**W.J. SAVAGE COMPANY**

KNOXVILLE, TENNESSEE

For more data circle 492 on Postpaid Card



### TAP BUSHINGS

Drives all standard taps from No. 0 to 1 1/8" and pipe taps from 1/8" to 1". Five o.d. sizes.

LESS TAP BREAKAGE

LESS TAP WEAR

Write for Bulletin

**BYCO INDUSTRIES**

2200 SNELLING AVE., MINNEAPOLIS, MINN.

For more data circle 493 on Postpaid Card



### Cut Cutting Costs

**KELLER POWER HACK SAWS**

5 Sizes ... 10 Models

MODEL

3CH

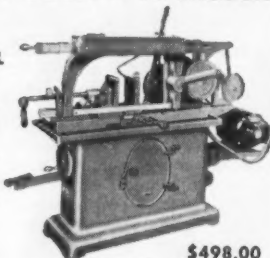
WET

CUT

6 3/4"

x

6 3/4"



\$498.00

F.O.B. Eau Claire, Wis.

CONTROLLED FEED PRESSURE, 40 to 170 lbs., two speeds and automatic lift on return stroke gives you faster cutting, longer blade life. Rugged, Oilite bearings throughout, 45° swivel vise and other features.

Ask your Industrial Distributor about KELLER Power

Hacksaws or write for

Bulletin 360 with prices.

**KELLER DIV.**

**Sales Service Mfg. Co.**

2361 University Ave., St. Paul 14A, Minnesota

For more data circle 494 on Postpaid Card

232 MODERN MACHINE SHOP

### new equipment ...

this casting a 1/2 by 7/8 inch slot is provided for holding magnetic sheet stopper. This is held in position with two set screws.

Fast settings are possible for bending sheets up or down, hook gage for turned down flange and gaging for small flanges and multiple forms.

This unit is easily applied to any press brake by installing a 3/4 by 2 inch bar of cold rolled steel. The unit slides over this bar and is easily locked in any desired position by two thumb screws.

For more data circle 159 on Postpaid Card

★ modern machine shop ★

### INDUSTRIAL PLANTS CAN REDUCE COOLANT COSTS WITH CHIP WRINGER

More and more industrial plants are realizing big savings in coolant and cutting oil costs by reclaiming these valuable liquids from metal chips, turnings, grindings and borings with



Olson Chip Wringer reduces coolant costs

March, 1961

the Olson Chip Wringer, according to the manufacturer, Olson Filtration Engineers, Cincinnati 12, Ohio.

Even after long periods of draining in a settling tank, metal chips or turnings still contain as much as 2½ to 3 gallons of cutting oil per 100 pounds. By running these chips for not more than three minutes in an Olson Chip Wringer, at least 90 and as much as 99 per cent of the valuable cutting oil remaining in the chips is removed. This means that the Olson Chip Wringer reclaims as much as 2.94 gallons additional cutting oil from every 100 pounds of metal chips.

Time saving is another important advantage that plants equipped with the Olson Chip Wringer are experiencing. It is claimed that in not more than three minutes, it reclaims again as much oil from every 100 pounds of chips than can be reclaimed in from 12 to 24 hours with a settling tank. For more data circle 160 on Postpaid Card

★ modern machine shop ★

#### ABRASIVE PRODUCT IMPROVES CRANKSHAFT FINISH

Improved finishes on crankshaft journals with pronounced savings in the cost of lapping can be achieved by car manufacturers who have adopted the new paper-backed coated abrasive rolls to supplant the cloth rolls used up to now.

The new 50 yard rolls, developed by Behr-Manning Co., Troy, N. Y., use a backing which is impregnated to add tensile strength, pliability and tear resistance. Because these rolls run in oil, yet must operate without slippage, an anti-slip sizing was developed and applied to the backing.

The company states that in sustained testing, the paper rolls have outperformed the cloth-backed abrasives in micro-inch readings and in other respects, at considerably lower cost. For more data circle 161 on Postpaid Card

March, 1961

## Angle Tangent to Radius WHEEL DRESSING *Simplified*

WITH  
**ROTHFUSS TOOLS**



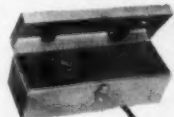
**THE G-5  
RADIUS DRESSER** is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on all wheels up to 10" and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation.  
**Price \$80.50**



**Price \$87.50**

#### THE G-2 ANGLE DRESSER AND TOOL HOLDER

is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1°; an excellent time saver to set up jobs to be milled, drilled, tapped on any desired angle.



All for only  
**\$149.50**

(including case  
and both tools  
with diamonds)

#### FREE STORAGE CASE

of light-weight steel, with a hinged top, heavy duty latch and a blocked interior to insure the safety of the dressers when carried.

#### OUR FIXTURES

will dress most radii and angles tangent each other, similar to those shown below.

Distributorship available in select territories

**ROTHFUSS TOOL**

COMPANY

BOX 2693 ELKWOOD STATION PROVIDENCE R.I.  
For more data circle 495 on Postpaid Card

MODERN MACHINE SHOP 233



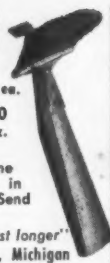
## KELM MACHINE CLEANER

Cleans clogged T-slots  
... spoons out chips  
and brushes them away.  
Fast! Efficient!

**\$1.95 ea.**  
**\$19.50**  
per doz.

Convenient design, heavy duty construction ... reduce machine cleaning "down time". Thousands in use. Order from dealers or direct. Send for literature.

"Clean machines produce more and last longer"  
KELM MFG. CO. R. #2, Celoma, Michigan



For more data circle 496 on Postpaid Card

## Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from  $\frac{3}{16}$ " to  $\frac{3}{4}$ " U.S.S. Inexpensive — Last for years.



Write for Circular  
**NIELSEN TOOL & DIE COMPANY**  
17336 Lahser Road  
Near Grand River  
Detroit 19, Michigan

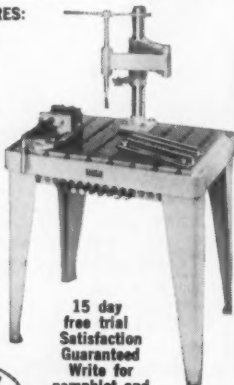
For more data circle 497 on Postpaid Card

## Allman Universal Hand Tapper 5 TIMES FASTER

A great time, labor and material saver. Fixture taps five holes to every one using the free hand method. Eliminates costly tap breakage.

### CHECK THESE FEATURES:

- Articulate arm swings clear of large table for placement of work.
- Limitless number of sizes of tapped holes without moving work piece.
- Vise holds work as small as  $\frac{3}{4}$ " square.
- Floating tap locates itself in hole.
- Individual spindle holds taps, thus change requires only seconds.



15 day  
free trial  
Satisfaction  
Guaranteed  
Write for  
pamphlet and  
information

**TOOLS,  
INC.**

1734 No. 25th Ave. • Melrose Park, Ill.

For more data circle 498 on Postpaid Card

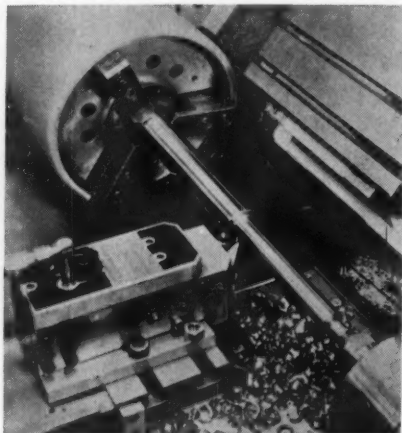
new equipment ...

## NEW DEVELOPMENT IN MACHINING BREAKS CHIPS, LENGTHENS TOOL LIFE

Development of a new machining device that fragmentizes chips to desired size while lengthening cutting tool life is announced by Cleveland Hobbing & Machine Co., 1311 Chardon Rd., Cleveland 17, Ohio.

Called the Cleveland Chipbreaker and Tool Booster, the device also simplifies grooving, plunging, forming and cutoff; facilitates use and increases life of form tools; reduces tool pressure and heating; increases machine capacity; simplifies size control problems and improves production output. The unit was designed for use on lathes, automatics, planers, shapers, etcetera—wherever multiple or single point tools are used for cutting metal.

The tool operates with a controlled, high frequency, hydraulically powered, oscillating action which maneuvers the tool cutting edge against the cut and backs it away for clearing and cooling



Chipbreaker with single point tool breaking chips while taking cut on 1020 steel



many times per second. The frequency of this motion is adjustable from 25 to 200 c.p.s. by using a dial on the chipbreakers.

This high frequency side motion into and away from the cut produces a cleaving action which fragmentizes chips to the desired size, as well as reduces heat and wear of the tool bit. Cleveland Chipbreakers work well when cutting any kind of metal from soft, stringy, materials such as copper and aluminum, through the range of various types of steels, including stainless and exotic materials. This chip-breaking feature eliminates chip removal downtime, provides safer and easier chip handling, reduces chip storage provisions and produces a higher dollar return on scrap.

For more data circle 162 on Postpaid Card

★ modern machine shop ★

### STANDARD HARDENED WAYS

Standard hardened way sections, produced in quantity and carried in stock by the Ohio Knife Co., Dept. 123-HH, Cincinnati 23, Ohio, make it possible for machinery builders to purchase ready-made machine ways to fit exact machine specifications at a cost that is said to be significantly lower than that involved in making home-made sections. Available in 12 cross sections in over 80 sizes, the multiple use of these versatile way sections in a variety of productive combinations, results in substantial savings.

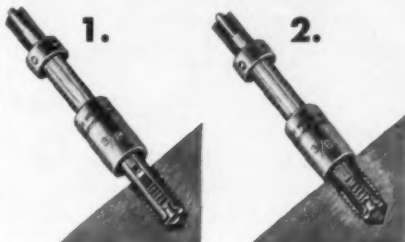
Available are flat ways, vee ways, composite die sections, heel and guide blocks and standard bronze wear plates. Each section is made to the closest tolerances and comes with cutting, forming or wear surfaces already machined, hardened and ground. The sections are provided in lengths up to 168 inches and can be cut to exact length, as desired.

In addition to their low initial cost, OK standard way sections insure long,

## A Specialized Tap Extracting Tool

*that will stop small  
cost leaks in your shop*

How much time do you waste removing broken taps? How many expensive parts are damaged or scrapped? Much of this time, and the parts, can be salvaged with Walton Tap Extractors.



1. The extractor's sturdy, heat treated steel fingers slip into the flutes of the broken tap.
2. The extractor is pushed down until it touches the broken tap, and the sleeve placed firmly in contact with work.
3. With a tap wrench (not shown) applied to the square end of the extractor, the broken tap is simply, easily backed out.

No annealing or drilling. The broken tap is removed without delay . . . and without damaging the threads. Furnished for 2, 3, 4, 5, 6, flute styles, in sizes No. 4 to 1½". Try them at our expense (free trial) in your shop.

Write for Data Folder No. 10



For more data circle 499 on Postpaid Card  
MODERN MACHINE SHOP 235

WHEN YOU USE MIST COOLING  
—USE THE BEST—



### GRAYMILLS MIST COOLANT SYSTEMS

Superbly engineered units of rugged corrosion-proof construction. Dual or single outlets. Precise liquid and air controls. Translucent containers let you see the liquid level. 1 and 2½ gal. sizes for water, coolants or oil.

Write today

**GRAYMILLS CORP.**

3769 N. LINCOLN AVE., CHICAGO 13, ILL.

For more data circle 500 on Postpaid Card

over 40 styles

Designed for "industrial" service — preferred by craftsmen everywhere.

write for information on complete line

**ADJUSTABLE CLAMP COMPANY**

"The Clamp Folks"

436 N. Ashland Ave.

Chicago 22, Ill.

For more data circle 501 on Postpaid Card

## RICE MILWAUKEE DIE FILERS

The Complete  
Die-Making Machines  
for all operations . . .  
**FILING — SAWING  
LAPPING**

- Work table tilts 4 ways
- 11', 13" and 18" table sizes
- Choice of 2 or 4 speeds or infinitely variable, 100 to 475
- Improved overarms
- You can dial correct speed and stroke with Model FS-VSS

Send for Bulletins on the complete Rice-Milwaukee line of Die-Filers and Profile Grinders.

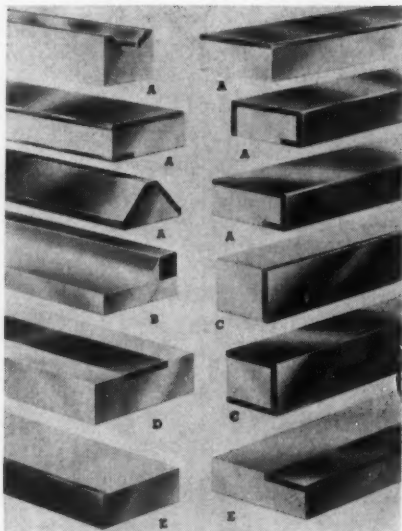
**RICE PUMP & MACHINE CO.**

226 PARK AVE., BELGIUM, WISCONSIN  
In Milwaukee's Great Industrial Area

For more data circle 502 on Postpaid Card

236 MODERN MACHINE SHOP

new equipment . . .



OK Standard Hardened Way Sections

trouble-free life and minimize costly downtime because of their exceptional wear resistance.

Also available are clad aluminum bronze wear plates, with ¼ inch of usable aluminum bronze cladding. These are ideally suited to run against O-Kni-Co hardened steel.

For more data circle 163 on Postpaid Card

★ modern machine shop ★

### MEDIUM DUTY BELT GRINDER

A medium duty belt grinder, compact in size, low in cost—yet powerful enough to handle most grinding jobs, quickly and economically—has been announced by the Grinding & Polishing Machinery Corp., 2530 Winthrop Ave., Indianapolis 5, Indiana.

Powered with a 3 or 5 h.p. motor, this medium duty grinder has a 90

March, 1961



Medium Duty Belt Grinding Machine

inch long abrasive belt with an 8 inch contact wheel. There is positive air tensioning of the belt. The machine is slightly larger than the G & P 6-72 models and considerably smaller than the heavy duty abrasive belt units. This intermediate size makes it ideal for use where space is a problem. For more data circle 164 on Postpaid Card

★ modern machine shop ★

### ELECTROLYTIC DRILL SHARPENER COMBINES VERSATILITY AND ACCURACY

Connecticut Special Machine, Inc., Bridge St., Winsted, Conn., announces the new Ampak Electrolytic Drill Sharpener for high speed steel twist drills. The company claims that the Ampak Drill Sharpener speeds the sharpening rate, three to seven times

faster than conventional grinding, but does not generate the heat of conventional methods that may alter the structure of the metal.

A greater degree of control of drill point geometry is possible through a simple setup of drill holding fixtures that can be made in seconds. Duplication of complex "special" drill points can be accomplished one at a time or on long, uniform, exacting production



## CANS for LAYOUT BLUE

**with Brush**

CONTENTS WON'T DRY OUT,  
BRUSH STAYS MOIST, LAYOUT  
BLUE IS EASIER TO APPLY,  
EASIER TO STORE WITH ELLISCO  
BRUSH TOP CANS. 3 OZ. TO  
1 QT. CAPACITIES.


Write for **FREE Bulletin**

E

American & Luzerne Sts.  
Dept. E-2, Phila. 40, Pa.

For more data circle 503 on Postpaid Card


## CAM milling/JIG boring



A SPECIALIZED CAM  
MILLING SERVICE, JIG  
BORING, SPOT WELDING,  
CONTRACT PRODUCTION

EXPERIMENTAL  
DEVELOPMENT

CAM CALCULATING  
SERVICE



Write for  
catalog 55-C

**EISLER ENGINEERING CO., INC.**

Chas. Eisler, Jr. President

734 So. 13th St.  
Newark 3, N. J.

For more data circle 504 on Postpaid Card



## WHY WASTE TIME?

Dress Profiles like these in a few minutes without Templates or Crusher Rolls with the Jeon Automatic Angle Tangent to Radius Dresser. It's fully universal.

Write for Price and Folder.  
REPRESENTATIVES WANTED  
IN SOME AREAS

**JEON MANUFACTURING CO.**

P. O. BOX 6750 WASHINGTON 20, D. C.



For more data circle 505 on Postpaid Card

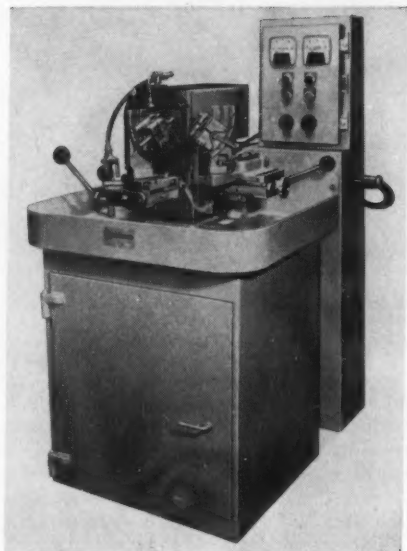
## **new equipment . . .**

runs. This control, uniformity and exacting drill point geometry can extend drill life from two to ten times.

The versatility of the Ampak allows all drill point angles from 90 to 180 degrees; lip relief angles from 0 to 20 degrees; and helix angles from 30 degrees positive to 30 degrees negative. These ranges give every possible mathematical drill point that is practical for drilling metal, fiber, plastics, wood and other allied materials.

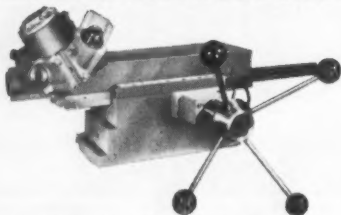
The Ampak Electrolytic Drill Grinder features a 1 h.p. motorized 300 amp electrolytic spindle; complete self-contained 8 volt, 300 amp. d.c. power supply; constant electronic voltage regulator; automatic visual overload warning system; self-contained electrolytic fluid systems.

Total machine weight is 950 pounds; dimensions are 56 inches high by 38



**The Ampak Electrolytic Drill Grinder**

### **ENGINE LATHE ACCURACY TURRET LATHE PRODUCTION**



For any Lathe from 10" to 24" swing.  
Repetitive indexing in all 6 positions to plus or minus .0003.

Turret body does not raise up when indexing.  
Write for folder.

**RELIABLE REPRESENTATIVES WANTED**



**OLSON INDUSTRIAL  
PRODUCTS, INC.**

40 W. WATER ST.  
WAKEFIELD • MASS.

For more data circle 506 on Postpaid Card

238 MODERN MACHINE SHOP

inches wide by 37 inches deep.

The Ampak Electrolytic Power Pak is a variable 1 to 8 volt, 300 ampere, d.c. power converter. Employing a silicon diode rectifier, it has only two voltage control tubes, each with a 10,000 hour life guarantee. These maintain a preset voltage within  $\frac{1}{4}$  of a volt at amperes from 0 to 300 at the cutting wheel. The Power Pak is available separately from the drill grinder for use in other power supply applications.

For more data circle 165 on Postpaid Card

★ modern machine shop ★

### **DUST COLLECTOR**

The Standard Electrical Tool Company, 2487 River Rd., Cincinnati 4, Ohio, announces that the "Air-rester" Dust Collecting Unit, available in two sizes, as recently approved for industrial use, has unusual efficiency. This self-contained motorized unit

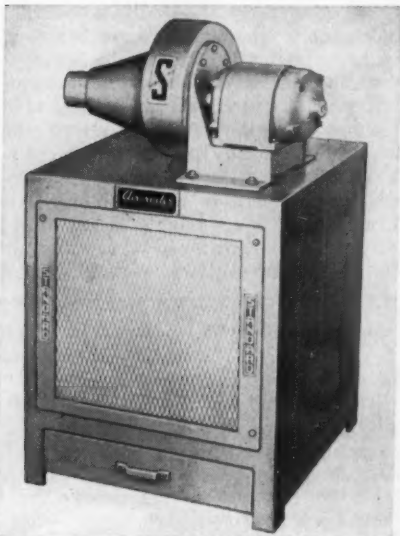
March, 1961

with unique design of a cyclone-like unit, contributes materially to average 90 percent dust collecting efficiency in grinding, polishing and buffing. This unit will also serve in removal of metal cutting chips from milling, shaping, drilling and other machine tools.

The inexpensive replaceable filters are of adequate area to permit the maximum in arresting even the finest of particles and releasing the cleaned air. Compactness in design delivers the rugged and well balanced distribution with no special mounting required. Both sizes consume a maximum of 24 by 24 inches of floor space.

The 2 cubic foot removable dust drawer adds to the good-housekeeping facility incorporated into these units. The rugged material handling fan is powered by permanently lubricated, totally enclosed motor supported on a four post design. All service parts are conveniently accessible.

For more data circle 166 on Postpaid Card



The "Air-rester" Dust Collecting Unit

March, 1961

# 4 Reasons why you should use

## GAMMONS DIE REAMERS

✓ Specially treated for today's modern die steels.

✓ Rapid cutting capacity.

✓ Tapers per inch .005, —.008, —.013 in stock.

✓ Large range of standard sizes in stock at all times for your convenience.

WRITE FOR  
COMPLETE INFORMATION

**GAMMONS • HOAGLUND CO.**

MANCHESTER 7, CONN.  
Manufacturers of helical taper pins, chucking, die makers and special reamers.

For more data circle 507 on Postpaid Card

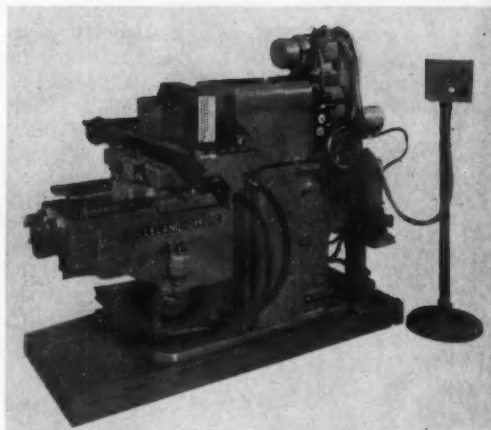
MODERN MACHINE SHOP 239



**new equipment . . .**

## KNEE-TYPE GUN DRILL CUTS FIXTURING COSTS

Designed to facilitate drilling deep precision holes in ferrous or non-ferrous materials, using carbide tipped drills, a knee-type gun drill is offered by Leland-Gifford Co., Worcester 1, Mass., with either self-contained hy-



*The Leland-Gifford Knee Type Gun Drill*

draulic feed or lead screw feed gun drilling unit. A knee-type setup eliminates expensive fixturing when a variety of work is to be gun drilled by coordinate elevating, traversing and swiveling of the table.

Recommended for drilling accurate holes up to  $\frac{1}{8}$  inch in diameter by 7 inches deep, the self-contained hydraulic feed unit offers the advantages of highly uniform feed rate with simple feed rate changing. Pump and spindle are independently powered with a  $1\frac{1}{2}$  h.p., totally enclosed spindle motor, driving through a timing belt drive. For general use, variable speed drives are available for speeds ranging up to 10,000 revolutions per minute.

## SUPERIOR® INDICATOR

**A Low-Priced Dial Type Indicator**  
Has 2 contacts  $1/32$ " threaded within  $1/8$ ". Double Faced. Reads front and back. Two Crystals. Double faced dial indicator complete with plated holder including  $1/32$ " and  $1/8$ " contacts —  
Superior Indicator #30...\$8.95  
Superior Indicator #75X  
with Universal Swivel...\$10.95  
Thousands of satisfied customers!  
**SUPERIOR INDICATOR CO.**  
P. O. Box 734, Rochester 3, N. Y.



For more data circle 508 on Postpaid Card

**CUT  
TOOL  
COSTS**

broken tools  
made like new again  
with **NU-TANGS**

Twisted or broken tangs replaced at low costs on any tool with a Morse Taper (sizes 1 to 6)  
Hundreds of leading industries save money on drills, reamers, countersinks, cutters, drivers, the NU-TANG way. Prompt delivery. Send for prices—or send tools for repair. All work guaranteed.

Send them to us like this!

We return them like this!

**NO WELDING!**

**NO SLEEVES!**

**NO SHORTENING!**

**NO DISTORTION!**

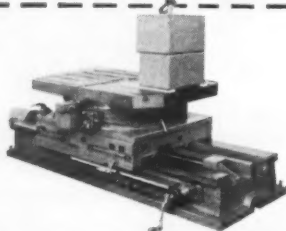
**GUARANTEED  
STRONG AS NEW!**

**NU-TANGS**

INC.

1339 Bates Avenue  
Cincinnati 25, Ohio

For more data circle 509 on Postpaid Card



## new AIRMIST tables index extra-heavy loads

6600-lb. load indexes easily on new 50" x 72" offset AIRMIST table. Range of standard sizes available, 36" and larger; special sizes on request. Any AIRMIST table can be furnished on runways for use with floor type boring mills.

THE CINCINNATI **GILBERT** MACHINE TOOL COMPANY • CINCINNATI 23, OHIO

For more data circle 510 on Postpaid Card



For holes having depth greater than 7 inches, the Leland-Gifford No. 24C Electro-Mechanical Gun Drilling Unit can be furnished with 12, 24 or 36 inch stroke. Driven by a 1½ h.p. Dynabrake motor through a non-slip timing belt, the spindle can be run at speeds from 720 to 12,000 r.p.m. with a 3,600 r.p.m. motor or at 360 to 6,000 r.p.m. with an 1,800 r.p.m. motor. Feed is actuated by and synchronized to the spindle speed and can be changed through pick-off gears from a minimum of 0.00019 i.p.r. to a maximum of 0.0015 inch in increments of 0.000015 inch, if desired. A separate ½ h.p. Dynabrake motor powers the lead screw for rapid approach, setup and rapid return.

This gun drilling equipment can be furnished as a complete machine, with base and hydraulic or lead screw feed, with or without tooling for specific operations, or as drilling units only on a do-it-yourself basis. Also available is a high pressure coolant system with an oil capacity of 100 gallons, capable of supplying a constant, closely controlled supply of clean oil under high pressure.

For more data circle 167 on Postpaid Card

★ modern machine shop ★

### COOLANT CONCENTRATE

Campbellene Cool Blue Coolant Concentrate, sold by American Chain & Cable Co., Inc., Allison-Campbell Div., 931 Connecticut Ave., Bridgeport 2, Conn., is now packaged in convenient one gallon white translucent plastic containers.

The dark blue color of Campbellene shows through the container so contents can be noted at a glance.

Complete product identification and mixing instructions are silk screened on the container, as well as one pint graduations in order to aid in proportional mixing with ordinary tap water. In most cases, one part of Campbellene

## PRODUCTION MEN!

CAN  
YOU  
APPLY



# 20 TONS PSI

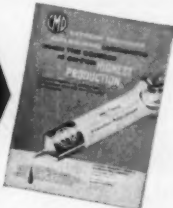
WITHOUT SCORING OR GALLING?

YOU CAN WITH CMD  
EXTREME-PRESSURE  
**ANTI-SCORING  
LUBRICANTS**

HERE IS A MOST REMARKABLE LUBRICANT for lathe centers, steady rests, thrust bearings, broaching, swaging, tapping—any operation where you must eliminate metal-to-metal contact!

LABORATORY TESTS PROVE CMD to be the only lubricant to withstand **EXTREME** pressures.

Read how big industry has solved reject problems, longer runs at savings up to 81% over commonly used lubricants. Free booklet of testimonials, new uses, new lubricating facts. Write:



**CHICAGO MANUFACTURING  
& DISTRIBUTING COMPANY**  
1928 W. 46th St. • Suite S-3 • Chicago 9

For more data circle 511 on Postpaid Card

MODERN MACHINE SHOP 241

## new equipment . . .

is used with 150 parts of water.

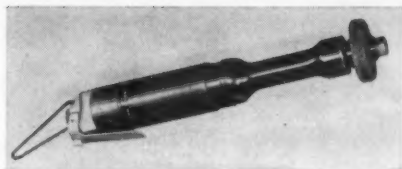
While Campbellene has many outstanding characteristics, it is low in cost. It does not support bacterial growth and will not turn rancid. It keeps the machine and parts clean and retards rust. It keeps wheels clean and sharp for longer cutting life. Recirculation of wheel chips is greatly reduced. It is non-foaming and, therefore, allows cooler cutting for longer wheel life.

For more data circle 168 on Postpaid Card

★ modern machine shop ★

### LONG-TYPE SMALL WHEEL GRINDERS

A series of long-type small wheel pneumatic grinders, developed especially for grinding into deep recesses and for two hand operation, has been



Long-Type Small Wheel Pneumatic Grinder

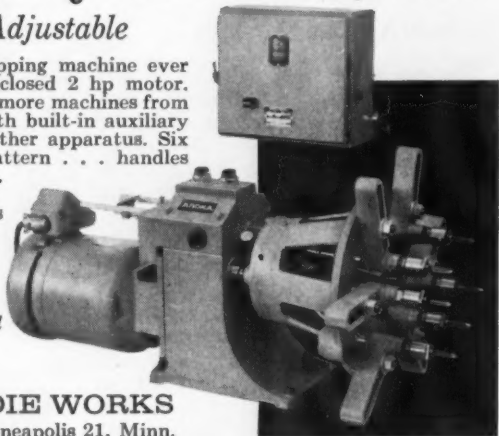
announced by Thomas C. Wilson, Inc., 21-11 Forty-Fourth Ave., Long Island City 1, N. Y. The arbor or spindle, driven by the powerful Wilson swastika-type motor, is independently mounted on two widely-spaced bearings, maintaining accurate alignment and permitting continuous, heavy duty small wheel grinding.

To cover a wide range of application requirements, Series 922 Grinders are made in 27 models, with speeds from 12,000 to 25,000 r.p.m. A choice of lever, push-button and ring throttle models is available. Six models are

## Capacity of six $\frac{3}{8}$ " taps . . . the new **ANOKA** Multiple lead screw tapping machine now yours for \$1,485

### Operate Any Position! Adjustable

Highest capacity, most rugged tapping machine ever offered at this price! Powerful enclosed 2 hp motor. Operate in any position. Work 2 or more machines from different sides in one operation with built-in auxiliary switch, or work in clusters with other apparatus. Six spindles are adjustable to any pattern . . . handles 6 N.C.  $\frac{3}{8}$ " taps in free cutting steel. Special adaptors for mounting on drill press columns. Lead screws of fatigue-proof steel with tensile strength of 140,000 psi; Brinnell hardness of 280 Rockwell C. Min. stroke:  $\frac{3}{8}$ ", max.: 3". Precise depth control. Here's real high production massiveness! Shop-tested for 2 years on production runs.



Write for full details

### COLUMBIA TOOL & DIE WORKS

716 39th Ave. N.E., Dept. M, Minneapolis 21, Minn.

For more data circle 512 on Postpaid Card

furnished with governors for work requiring constant speed and power. For more data circle 169 on Postpaid Card

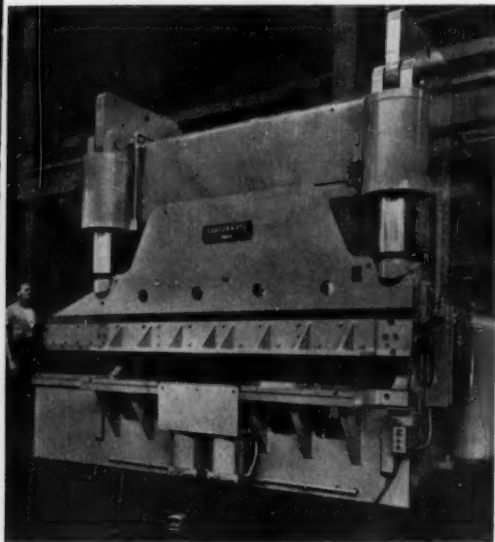
★ modern machine shop ★

### HYDRAULIC PRESS BRAKE

The Cincinnati 300H Hydraulic Press Brake can be utilized as both a punching and bending machine. Ram angle brackets, combined with a permanently widened bed equipped with die cushions plus the extended bed and ram, provide this press brake with exceptional versatility.

For operator convenience, all machine controls are mounted at the right hand end of the machine. Two speeds to the ram offer both a fast pressing speed and a full tonnage pressing speed.

Specifications include: distance between housings, 10 feet 5¾ inches; total overall die surface, 15 feet; bending capacity, ¾ by 10 inch mild steel;



New Cincinnati Hydraulic Press Brake

March, 1961

## JIFFY PADDED SHIPPING BAGS



**SO EASY  
TO PACK!**



**SO SIMPLE  
TO OPEN!**

### JIFFY PADDED SHIPPING BAG—

the all-in-one shipping unit — provides cushioning, moisture-resistance, insulation, and heavy duty protection. Saves labor, time and materials. Handy tear-tape opener for easy removal of contents.

Send for your **FREE SAMPLES** today!



**JIFFY MANUFACTURING CO.**

360 Florence Avenue Hillside, N. J.

For more data circle 513 on Postpaid Card

MODERN MACHINE SHOP 243

## new equipment . . .

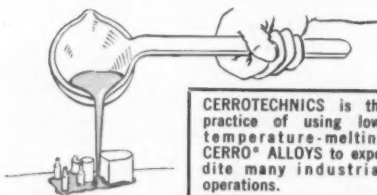
stroke, 18 inches; throat, 10 inches; open height, 29 inches; 36 inch extension at left end of bed and ram; 36 inch permanently widened bed; ram planed and drilled for 12 inch high angle brackets; clevis mounted cylinders; hydraulic manifold block to reduce piping and connections to a minimum; tonnage control for protection of dies; tonnage indicator; red and green lights to predict direction of ram movement; bottom of stroke control reading in thousandths and located in front of machine, convenient to the operator; automatic leveling control to ram with enclosed tape and direct acting servo; ram tilt control reading in thousandths for fade out work; 30 h.p. electricals.

This press brake is available from The Cincinnati Shaper Co., Cincinnati 11, Ohio.

For more data circle 170 on Postpaid Card

## CERROTECHNICS

*saves* TIME • LABOR • MONEY  
in locating punches



CERROTECHNICS is the practice of using low-temperature melting CERRO® ALLOYS to expedite many industrial operations.

For instance: punches are quickly and accurately located in the plate with CERRO-MATRIX®. Saves many costly man-hours machining from the solid steel. Write for further information.

See us at Western Metal Exposition  
Los Angeles, March 20-24, Booth No. 1010.

\*T. M. Cerro Corp.

### CERRO SALES CORPORATION

SUBSIDIARY OF CERRO CORPORATION

Room 1501, 300 Park Avenue, New York 22, N. Y.

For more data circle 514 on Postpaid Card

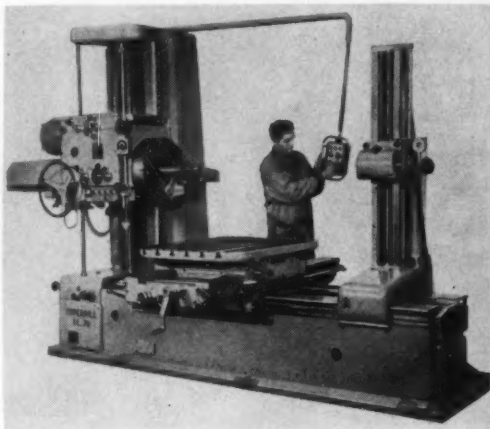
244 MODERN MACHINE SHOP

## HORIZONTAL BORING MILL EQUIPPED WITH SUSPENSION SYSTEM

The Model A176, a 3 inch bar Supermill Horizontal Boring, Milling, Drilling and Turning Machine is now equipped with a unique Airflo Suspension System. This system eliminates metal-to-metal contact on the table movement.

Both the longitudinal and cross travel of the saddle and table are completely supported by an infinitesimal film of air, supplied by a built-in air-oil compressor. The volume of air required is minute and the pressure extremely low, measured in a fraction of 0.0001 inch. Both table and saddle riding on lubrication of compressed air and oil results in smoothest possible traverse—both for feed and rapid return. Since there is no metal-to-metal contact, wear is completely eliminated.

In addition to the new Airflo Suspension System, the AL76-A Supermill has complete Square "D" pendant controls and hydraulic clamping of head, table and outboard, in addition to optical measuring controls.



View of Supermill Horizontal Boring Mill

March, 1961

This model has been introduced by S & S Machinery Co., 140 Fifty-Third St., Brooklyn 32, New York.

For more data circle 171 on Postpaid Card

★ modern machine shop ★

### SLIDE ASSEMBLIES WITH HARDENED STEEL WAYS

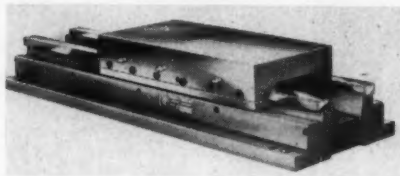
A line of precision slide assemblies with hardened steel ways is announced by Russell T. Gilman, Inc., 621 Beech St., Grafton, Wis. Standard slides come in 33 practical saddle-and-base size combinations and with optional auxiliary equipment built in as required for the individual application.

The slide assemblies are designed for heavier loads and longer maximum stroke lengths than Gilman dovetail slides. Cross-section areas are more massive. Saddle working surfaces are larger. Gilman quality construction maintains accuracy and ease of movement and assures extended life in frequent or continuous operation.

Saddles come in widths of 9, 11 and 15 inches. In each saddle width series, a selection of four saddle lengths and three base lengths is offered. The base length should always be at least two-thirds of the saddle length.

Standard saddle working surfaces range from 9 by 9 to 15 by 60 inches. Maximum stroke lengths up to 45 inches are available.

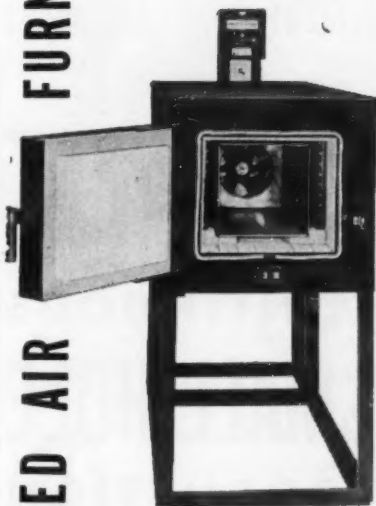
To meet the special requirements of every application, these slide assemblies can be furnished with a variety of useful auxiliary equipment built-in: (1) power cylinder, (2) lead



Standard Precision Slide Assemblies

March, 1961

## FURNACE



## LUCIFER FORCED AIR

The Lucifer Furnaces, Inc., Series 4055 furnaces are manufactured in ten standard models with 800° F. or 1250° F. maximum operating temperatures. These furnaces are designed for tempering, drawing, heat treating aluminum, and glass annealing. Each furnace is a complete unit . . . controls included. They are equipped with a large fan and motor to force circulation of air in the working chamber to insure maximum uniformity of temperature.

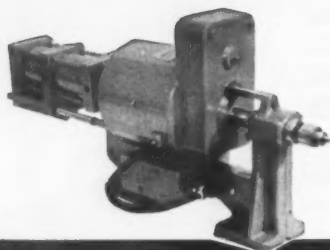
All electric heat treating furnaces by Lucifer feature • low initial cost • low upkeep • top production performance • minimum replacement downtime. For free engineering advice, parts, or product information . . . write, wire or call . . .

### LUCIFER FURNACES, INC.

Neshaminy 7, Pennsylvania  
Diamond 3-0411

For more data circle 515 on Postpaid Card

MODERN MACHINE SHOP 245



## Automatic Units for CONTINUOUS SMALL HOLE PRODUCTION

Automation beyond your budget? Not when you can get all these features at Electro-Mechano's new low price:

- Instant Fingertip Drill Speed Selection • Controlled Air Hydraulic Feed • Electric Motor Spindle • Positive Depth Stop • Rapid Withdrawal from Work

Price: NOW \$295.00 (formerly \$340.00)

### 3 MODELS

- No. 111 3/32" Capacity—1,000 to 10,000 RPM or 2,500 to 15,000 RPM—Continuously Variable Speed Control.
- No. 113 1/4" Capacity—15 Speeds to 15,000 RPM.
- No. 603 1/2" Capacity—600 to 4,000 RPM—Variable Sheaves.

Free Descriptive Literature

**THE ELECTRO-MECHANO CO.**

265 E. Erie St. • Milwaukee 2, Wis.

For more data circle 516 on Postpaid Card

246 MODERN MACHINE SHOP

## new equipment ...

screw, (3) electric cycle controls, (4) one-shot lubrication system, (5) composition way wipers and (6) accordion-type way covers.

For more data circle 172 on Postpaid Card

★ modern machine shop ★

## PUMPING SYSTEM USED FOR CIRCULATING LUBRICANTS

There are many instances where constant feed or flood lubrication, with recirculation, of bearings and journals on large machinery and printing presses is desirable. This can be quickly and efficiently accomplished through installation of a Graymills Pumping System.

Model No. SGI-16-08 (illustrated) consists of a five gallon container and a gear-type pump, driven by a 1/8 h.p. motor. This unit delivers up to 1 g.p.m. System also includes a pressure relief valve which can be set to control pressures up to 75 p.s.i. The 1/8 h.p. motor is totally enclosed. These units are available from Graymills Corp., 3769 North Lincoln Ave., Chicago 13, Ill. For more data circle 173 on Postpaid Card



Graymills Model SGI-16-08 Pumping System

March, 1961



# Fortune

## TUMBLING MEDIA

### for Deburring and Finishing

Preforms in over 300 shapes, sizes and bonds for all barrel and vibratory operations.

- Finest bonding materials
- No "roll-over" of burrs
- Minimum media fracture
- Maximum production

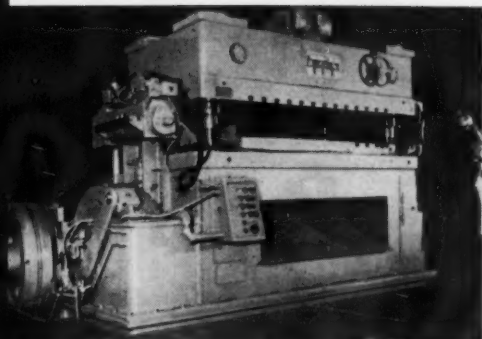
Our FREE lab service will promptly test your parts and recommend proper tumbling media, without obligation.

**WRITE TODAY FOR OUR  
TUMBLING MEDIA FILE . . .**  
-including valuable information on proper selection of preforms.

**Fortune Industries, Inc.**

11770 DEXTER RD. CHELSEA, MICH.  
Phone GR. 9-3621

For more data circle 517 on Postpaid Card  
MODERN MACHINE SHOP 247



Henry & Wright 250 Ton Dieing Machine

### 250 TON DIEING MACHINE

A 250 ton automatic, Henry & Wright, double crank dieing machine was built by Koehring Co., H-P-M Div., Mount Gilead, Ohio, for one of the larger automotive manufacturers. This machine, equipped with progressive dies, makes it possible to combine many complex stamping and forming operations into one progressive production sequence.

One of the biggest single design features of this high production machine is a double crank arrangement that supports the upper cross-head at both ends. This two-point suspension principle results in rigidity and strength against off-center loading flexibility in the ratio of die bed area to press capacity.

The characteristics of the underdrive system—high speed operation; accurate alignment; low center of gravity; and a pulling, rather than a pushing, stroke—are combined with a double crank to extend the range of work that can be handled with progressive stamping. The machine is equipped with a self-contained recirculating lubricating system.

Thermal switches on all main bearings will stop the press should bearings become overheated.

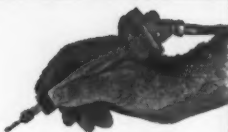
For more data circle 174 on Postpaid Card

70,000 R.P.M. TURBINE AIR GRINDER

GUARANTEED  
FULL YEAR

\$5950

complete  
including  
accessories



Perfect for intricate  
tool and die work

NEWAGE INDUSTRIES, INC.  
222 York Road Jenkintown 19, Pa.

For more data circle 518 on Postpaid Card

### CENTERLESS GRINDING

Straight cylindrical, shoulder, profile and multiple diameter, internal and surface grinding of any material. Precision ground taper pins and straight dowel pins. Brown & Sharpe and Swiss Automatic aircraft and standard screw machine parts, heat treated and ground, if necessary. Light bench type production drilling. Prompt service. Send prints for estimates.

31 YEARS—SERVING INDUSTRY  
PORTER MACHINE CO., INC.

Mfgs. of Por-Matic air operated drilling fixture.  
Drill bushings for same in stock.

3139 Enyart Ave. TR 1-4422 Cinti. 9, Ohio

For more data circle 519 on Postpaid Card

Get the straight  
**DOPE!**

You can count on Tamms quality Blue Layout Dope. Won't chip, crack, or flake. Dries fast, highly oil resistant. Get the straight dope... get Tamms!



WRITE FOR  
SAMPLE!

**Tamms** INDUSTRIES CO.

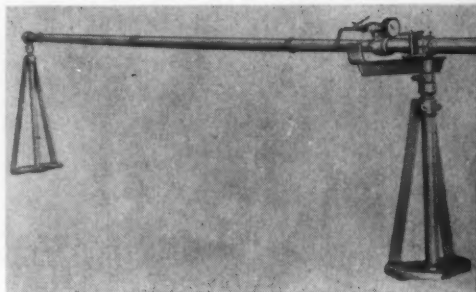
228 North La Salle Street, Chicago 1, Illinois

WHERE YOUR BUSINESS IS APPRECIATED!

For more data circle 520 on Postpaid Card

248 MODERN MACHINE SHOP

new equipment...



View shows the new PowerGrip Bar Feed

### BAR FEED

Round, square or hex bar stock can be fed into lathes or screw machines automatically by air pressure with the PowerGrip Bar Feed, announced by PowerGrip, Inc., Rockfall, Conn. The stock can be fed for any desired length to a fixed stop. All sizes and shapes within the capacity of the unit can be handled without setup change. Height adjustment from 38½ to 50 inches on all models is provided by telescoping stands.

Standard equipment of PowerGrip Bar Feeds includes regulator, gage, valve, piston and two adjustable stands. Tube i.d. is 9/16 to 4 inches. Length is 6 to 20 feet.

Model 804 — 1⅜ inch size, with nominal capacity for 6 feet bars—will handle 12 foot bars. Model 805—1¾ inch size, with nominal capacity for 6 foot bars—will handle 12 foot bars. Model 806—2⅞ inch size, with nominal capacity for 6 foot bars — will handle 12 foot bars. Model 807—3¾ inch size, with nominal capacity for 6 foot bars—will handle 12 foot bars. Special sizes can be furnished in capacities to 3¾ inches and in lengths to 25 feet.

For more data circle 175 on Postpaid Card

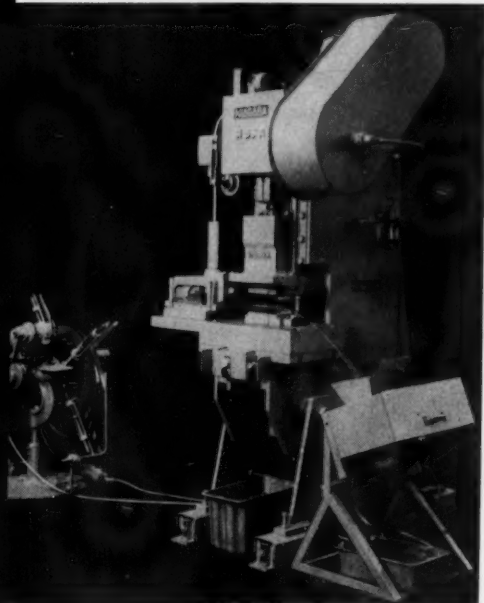
March, 1961

## **AUTOMATIC O.B.I. PRESSES OPERATE AT ULTRA-HIGH SPEEDS**

A line of automatic ultra-high speed o.b.i. presses boosts production and reduces costs on short stroke stamping jobs, according to Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, New York.

The 35 ton machine shown operates at speeds up to 1,000 s.p.m. in producing parts at a rate of more than a million per day.

Featuring an extra rugged, welded, all-steel frame, low inertia slide and connection and non-metallic ways, the Series M Presses are available in 22, 35, 45 and 60 ton capacities (both non-geared and single-geared). Shaft diameters range from 2½ to 4 inches. Fully enclosed drives provide safer, cleaner press operation, as well as improved appearance. Slide is design-



Niagara 35 Ton Automatic O.B.I. Press

March, 1961

## **THE BEST PORTABLE ELEVATING TABLE**

**YOU CAN BUY . . .  
(Eliminates Cranking)**



2000 LBS. OR 1000\* LBS. CAPACITIES  
\*ILLUSTRATED

### **A precision made MIDWEST TABLE Costs no more!**

- ✓ It's hydraulic . . . positions work or feeds at desired height without use of hands
- ✓ Rigid cast construction
- ✓ Top turns 360° and clamps
- ✓ Foot releases valve to lower
- ✓ Machined top surface can be used as work table.
- ✓ Roller bearing casters with ball bearing swivels
- ✓ Floor clamping available extra

**Write today . . . specials on request**

# **MIDWEST**

114 WEBSTER ST. • DAYTON 2, OHIO  
For more data circle 521 on Postpaid Card

MODERN MACHINE SHOP 249

## new equipment . . .

ed specifically to meet the requirements of high speed, precision stamping work—unusually long and rigid guiding; more mounting space, symmetrical around point of load application for solid support and longer die life.

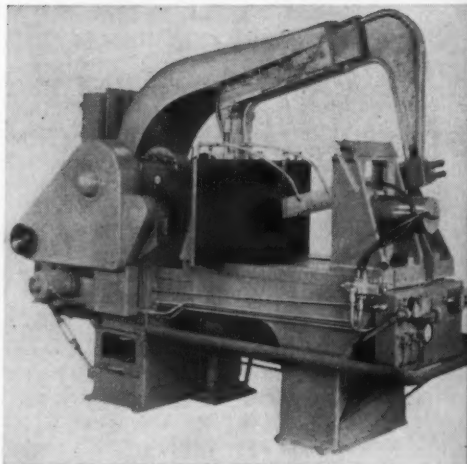
Models in the same tonnage capacities are also available for high speed operation.

For more data circle 176 on Postpaid Card

★ modern machine shop ★

### METAL SAW WILL CUT UP TO 24 BY 24 INCHES

A heavy duty hydraulic saw, the Model 2424, becomes the largest in the metal saw line of Racine Hydraulics & Machinery, Inc., 2000 Albert St., Racine, Wis. It will cut material up to 24 by 24 inches in size, or with 25



Model 2424 Heavy Duty Hydraulic Saw

inch diameter, employing a 36 by 4½ inch by 0.125 by 2T saw blade to obtain maximum capacity.

A 10 h.p., four speed Lima motor and a built-in, three speed gear box provide 11 variables in speed ranging from 12 to 145 s.p.m. The stroke length is 6 inches.

A top feature of the machine is the adjustable pressure type hydraulic feed with a range of 0 to 350 p.s.i. A heavy duty hydraulic chuck cylinder which is adjustable vertically, holds the workpiece.

In addition to meeting demands for saws of greater dimension, the model will find a market in cutting of the high density alloys, or so-called "exotic" metals such as titanium, hastalloys, beryllium or zirconium.

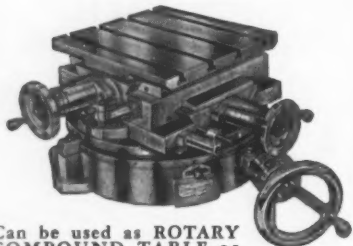
For more data circle 177 on Postpaid Card

★ modern machine shop ★

### BUILDING BLOCK DUPLEX MILLER

Using the "building block" principle, i.e., building specialized machines from basic milling units, the U.S. Burke Machine Tool Co., 3

### STEVENS—THREE-IN-ONE ROTARY COMPOUND TABLES IN 3 SIZES



Can be used as ROTARY COMPOUND TABLE or separated to use individually as Compound table alone and Rotary table alone—all on one investment.

The Stevens-Three-in-One will save set-up time and reduce inaccuracies caused by multiple set-ups.

See your dealer or write for bulletins

**The John B. Stevens Company**  
Main Street, Somersville, Conn., U. S. A.

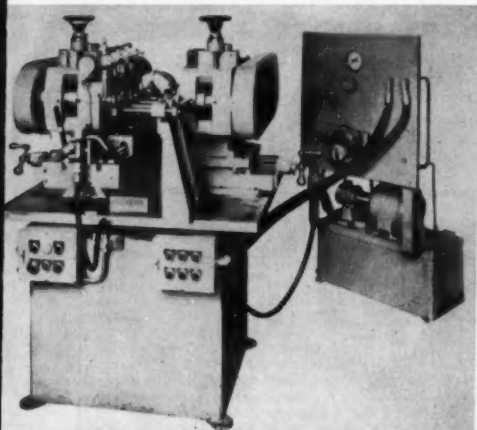
For more data circle 522 on Postpaid Card

Brotherton Rd., Cincinnati 27, Ohio, has developed a new semi-automatic U.S. Duplex Half-Mill.

The new machine, designed and produced for a major U.S. manufacturer, squares both sides of three 1/2 inch thick steel plates simultaneously—in production lots. Variations of this highly flexible duplex unit can perform slotting, sawing, keyway cutting, face milling, slab milling, boring and a variety of other operations.

Achieving its specialized purpose through a combination of basic units, the machine incorporates two standard No. 40 taper spindle heads, standard cross slides and a standard hydraulic system with full electrical controls.

The two milling heads, with roller bearing spindle mounts, are powered by 1 1/2 h.p., 1,200 r.p.m. drive motors, with selective spindle speeds up to 2,370 r.p.m. Both Half Mills are equipped with manual screw vertical adjustment and are mounted on manually positioned cross slides. The 10 by 42 inch table and box type slide, with hand fitted tapered gib and one shot lubrication, is powered by an 18



Special Building Block Duplex Half-Mill

March, 1961



**Make 3  
hammers  
AT ONCE!**



It's the NEW, easy, economical, quick way to mold your own lead hammers on a production basis with "SHUR-GRIP" handles and this COOK production mold.

Write for circular and prices

**COOK LEAD HAMMER SERVICE**

67 MASSASOIT AVE., EAST PROVIDENCE, R. I.

For more data circle 523 on Postpaid Card



**DRILL THESE HOLES**

BY A QUICK, EASY, INEXPENSIVE METHOD

Your business letterhead will bring literature.

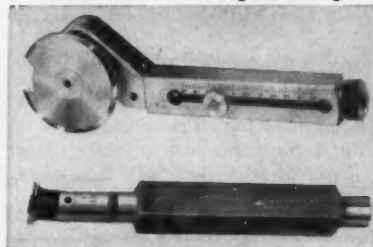
**WATTS BROS. TOOL WORKS**

Wilmerding, Pa.

For more data circle 524 on Postpaid Card

**Patented MP TOOL  
CUTS THREADS  
40% FASTER!**

Graduated scale for angular setting



**PERFECT PROFILES: ENDS TORN THREADS**

Cut costs sharply with MP tools for internal or external use. Thread is engaged depth-wise by circular cutting disc (high speed or carbide) which has negative profile and adjustable angle. Machines both thread flanks simultaneously. Shavings released separately, can't disturb thread formation. MP pays for itself in savings. Swiss made with Swiss precision. Stock carried in U.S.

**ACME TOOL CORP.**

P. O. BOX 1165 • CORAL GABLES 34, FLA.

For more data circle 525 on Postpaid Card

MODERN MACHINE SHOP 251



## new equipment . . .

inch stroke hydraulic system.

The hydraulic feed unit, with panel mounted electrical controls, is independent of the machine proper, thus affording convenient positioning and ease of servicing. The hydraulic unit provides rapid traverse approach, controlled cutting speed and distance, plus automatic rapid table retraction. Conveniently located trip dogs may be repositioned to alter the feed cycle as required.

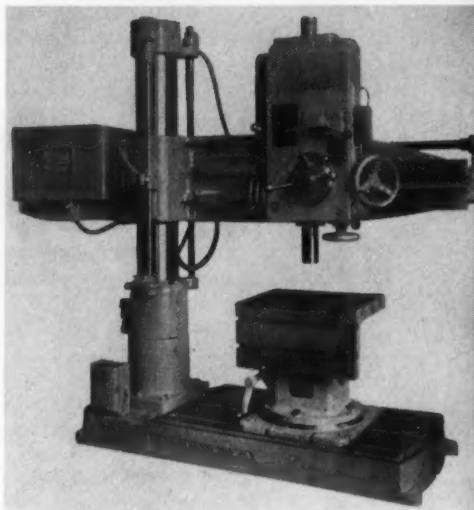
For more data circle 178 on Postpaid Card

★ modern machine shop ★

### RADIAL DRILLS

The Morris Machine Tool Co., 2017 Eastern Ave., Cincinnati 2, Ohio, has announced a price cut in its Mor-Speed line of heavy duty radial drills. The new prices, lowest in several years, are made possible by increased production and sales volume, as well as progressive application of Morris' own version of high production machining techniques.

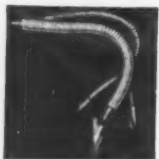
In addition to the price cut, the Mor-Speed Radial Drill has been redesigned to incorporate the very latest advances in machine tool design and engineering. The result is a dramatic new clean-line appearance and an even greater accuracy and ease of operation than before.



The Mor-Speed Radial Drilling Machine

Providing 12 spindle speeds, six spindle feeds and 12 inch spindle travel, the Mor-Speed Radials feature completely centralized controls, fully enclosed elevating mechanism, with electric column clamp, on 11 inch models and roller bearing mounted head. External electrical conduit has been eliminated, and column clamp control buttons are flush mounted, as is a 110 volt accessory receptacle. Total vision lighting assures complete illumination of the workpiece and

### "SEALFLEX" TUBING



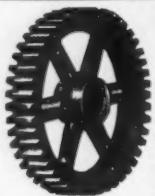
**Leakproof—  
Stays in place  
For Coolants, Cutting  
Oils, Solvents**

Made of steel with brass fittings — males, nozzles, stopcocks, etc., made in  $\frac{1}{8}$ "  $\frac{1}{4}$ "  $\frac{3}{8}$ "  $\frac{1}{2}$ "  $\frac{3}{4}$ " I.D. Write for bulletin and prices.

**VERMONT FLEXIBLE TUBING CO.**  
Lyndonville, Vermont

For more data circle 526 on Postpaid Card

252 MODERN MACHINE SHOP



### GEARS

**In Stock—Immediate  
Delivery**

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

Send for Complete Catalog No. 20

**CHICAGO GEAR WORKS**  
440-50 N. Oakley Blvd., Chicago 12, Ill.

For more data circle 527 on Postpaid Card

March, 1961



elimination of operator blind spots. A new positive displacement lubrication system provides maximum lubricating efficiency.

These features plus many more, are a part of all Morris Radial Drills, available in 9 inch column heavy duty sizes with 3 and 4 foot arms, in 11 inch column heavy duty size with 3, 4, 5 and 6 foot arms and in 9 inch column light duty size with 3 and 4 foot arms.

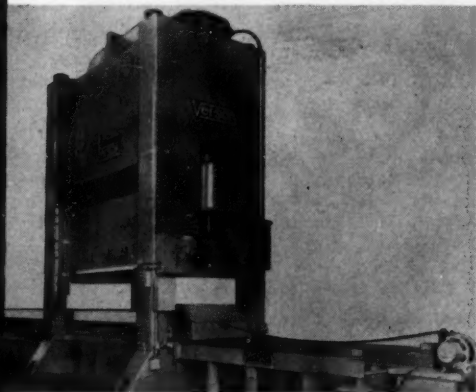
For more data circle 179 on Postpaid Card

★ modern machine shop ★

### MOVING BOLSTER ASSEMBLY CUTS DIE CHANGE TIME

A simplified type of moving bolster assembly has been announced by Verson Allsteel Press Co., 9300 South Kenwood Ave., Chicago 19, Ill. The new development provides the convenience of a moving bolster arrangement for quick die change at a cost lower than moving bolster arrangements previously available.

The assembly can be furnished as either a single moving bolster unit or a double bolster unit. In a single unit, the bolster is mounted on a self-



Verson Double Moving Bolster Assembly installed on two point eccentric press

March, 1961

### DURANT HEADED PINS



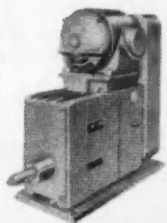
All tool steel Rockwell C 58/60 — honed finish, no pickup — heads left soft and are guaranteed uniform. Attractively priced at \$12. to \$19. per C. We manufacture 103 and stock 103 sizes for immediate delivery.

Available through our distributor or order direct.  
Write for complete prices and details.

**DURANT TOOL CO.**  
17 THURBERG AVENUE  
PROVIDENCE 5, RHODE ISLAND

For more data circle 528 on Postpaid Card

### DRILL FEED UNITS

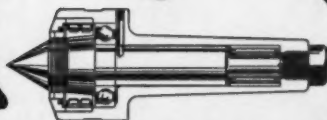


for drilling, tapping, milling, boring, Cam, hydraulic, or lead screw. Many sizes, 1/2 to 15 hp. Avey Division, Motch & Merryweather Cincinnati 1, Ohio

*Avey*

For more data circle 529 on Postpaid Card

## NIELSEN Heavy Duty Live Centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

Write for catalog  
M on live centers

**NIELSEN, INC.** LAWTON, MICHIGAN

For more data circle 530 on Postpaid Card

MODERN MACHINE SHOP 253

### **new equipment . . .**

contained traction unit which moves on trolley type wheels over tracks on a table extending from one side or the other of the press. The traction unit is driven by a d.c. motor and separate gear reducer which is designed to slow the motion of the bolster as it approaches the positive stops. In pressing position, hydraulic cylinders under the trolley wheels lower the bolster to rest firmly on the bed. To move the bolster out for tooling change, the hydraulic cylinders raise the bolster until the wheels are at the level of the extension table, and then the drive moves the bolster out on the table where it is easily accessible for tooling change. Double units utilize extension tables on both sides of the press—two traction units with bolsters connected in tandem. When one bolster is in pressing position, the other

bolster is on the extension table where tooling changes can be made while the other bolster is in use.

For more data circle 180 on Postpaid Card

★ modern machine shop ★

### **LEAD SCREW TAPPING HEAD**

A lead screw tapping head that fits any drill press (but uses it for power only) is introduced by Ettco Tool & Machine Co., Inc., Brooklyn 37, New York.

Identified as the Model No. 2LS "Auto-Tap," this unit has actuating lever, stop and depth control as integral parts of its design. The lead screw carries the thrust, while the tap only cuts the thread.

With this unit, even unskilled operators can produce precision tapped holes. Production rates can be increased while tap breakage and work spoilage are reduced as a result of the



Cuts up to  
2,000  
tubes per hour

## **PAYS for ITSELF NO MATERIAL LOSS**

### **Continental PIPE AND TUBE Rotary Cut-Off Machine**

It zips right through tubes from  $\frac{3}{8}$ " to  $1\frac{1}{4}$ " O.D., from light gauge to 16-gauge wall thicknesses. Adjustable table with Tri-Roller Assemblies and Manual Stock Loader. Also Cut-Off Machines up to 12" diam., air or hand-operated.

Machine Rental Plan

**Continental**

SINCE 1919

machine co.

2345 W. NELSON ST. • CHICAGO 18, ILL.

For more data circle 531 on Postpaid Card

"Auto-Tap" design and operating advantages.

Featured is a hardened, precision-ground lead screw with pitch matched to that of the tap being used, thereby overcoming initial starting torque. Longer life is assured for even small diameter taps.

Stripped, pulled or faulty threads, caused by downward or upward pressure by the operator, are eliminated.

The Model No. 2LS "Auto-Tap" Lead Screw Tapping Head will drive taps up to 5/16 inch or as fine as No. 0.

The lead screw runs in a special-alloy bronze nut, which is adjustable for wear, and is powered by a sensitive cone clutch that runs in oil.

A positive depth control assumes perfect threads, even in blind or recessed holes.

For more data circle 181 on Postpaid Card



The "Auto-Tap" Lead Screw Tapping Head

## GEAR DEBURRING MACHINE HAS 24-INCH MAXIMUM SWING

The Redin Production Machine Co., 2433 Twentieth St., Rockford, Ill., announces the Model 24 Universal Gear Deburring Machine.

This machine provides angular adjustment to the work and wheel spindles which makes it adaptable for spiral bevel gears, as well as spur,



Molybdenum  
Disulfide  
Pressed into a  
Crayon-Type Stick

## MOLYKOTE

### *Lubricating Sticks*

*Ideal for many rub-on applications*



The Alpha-Molykote Corp. MMS-3  
Stamford, Conn.

Please send me your Bulletin 128.

NAME \_\_\_\_\_  
COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_  
ZONE \_\_\_\_\_ STATE \_\_\_\_\_

Send For  
Our New  
Bulletin 128  
On Molykote  
Lubricating  
Sticks

**THE ALPHA-MOLYKOTE CORP**  
Stamford, Conn.

For more data circle 532 on Postpaid Card

for as little as  
**\$22.00**  
**COMPLETE**  
 IN U.S.A.

Get This Production Boosting  
**'TRICO-MIST'**  
**COOLANT SYSTEM**  
 Increase Production And Tool  
 Life As Much As 500%.



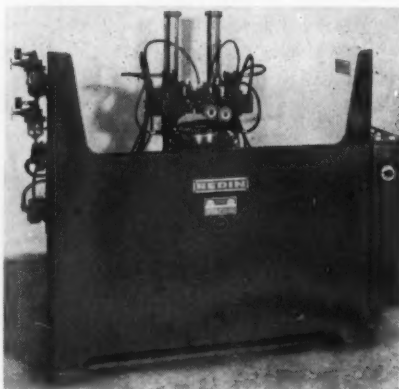
For drilling, tapping, milling, sawing, grinding, etc. Removes heat from cutting edges of tools and work. Feeds can be increased considerably, finer finishes and accuracy are obtained. TRICO-MIST absorbs heat, thereby quenching it faster than flood coolants which only transfer it. Chips slide freely up the tool face and are blown away automatically. Simple needle valve controls size and volume of mist spray. Attaches to shop air line. Available with one and five gallon containers—single or multiple outlets—single or dual valve control.

SEND FOR BULLETIN 37

**TRICO FUSE MFG. CO.**  
 MILWAUKEE, WIS. U.S.A.

For more data circle 533 on Postpaid Card  
 256 MODERN MACHINE SHOP

*new equipment . . .*



*Model 24 Universal Gear Deburring Machine*

helical, straight bevel and, also, work gears.

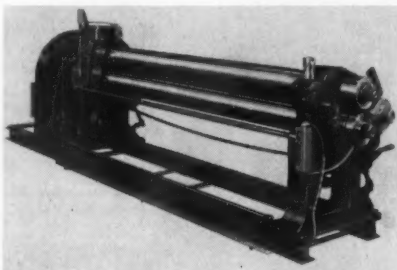
Maximum swing is 24 inches and the work spindle has a 6 inch hole to accommodate gears and pinions with integral shafts.

For more data circle 182 on Postpaid Card

★ modern machine shop ★

### **COMBINATION METAL FORMING ROLL DOES JOB OF SEVERAL MACHINES**

Hendley & Whittemore Co., 100  
 Blackhawk Blvd., South Beloit, Ill.,



*The Hendley-Beloit Metal Forming Roll*

March, 1961

has developed one machine that does the job of several, as illustrated. It is an initial type sheet bending roll in capacities from 20 gauge to 7/16 inch in widths ranging up to 122 inches, and an angle bending roll that will take angles from 1 by 1 by 1/4 to 2 1/2 by 2 1/2 by 1/4.

The rolls of the initial type bending roll have extended journals with adjustable guide rollers and interchangeable roll heads so that in addition to angles, tees, channels, flat and round bars can be shaped accurately and quickly. Controls are conveniently located at the operator's position.

The overall machine is extremely husky; designed for long, dependable service under the most adverse conditions.

Thus this Hendley - Beloit Machine supplies both an angle bending roll and an initial type sheet bending roll at only a fraction of the cost of the two separate machines.

This extends its use and production in shops of all sizes. It is a versatile machine and it is also a money saver.

For more data circle 183 on Postpaid Card

## TAPHOLDERS WITH SELF-FEED AND ADJUSTABLE DEPTH CONTROL

Tapmatic Corp., 845 West 16th St., Costa Mesa, Calif., announces versatile tools that may be used as either releasing or non-releasing tapholders on all machines with reversing spindles. Extremely smooth in operation, they convert, in effect, any machines

# Save Money...Save Time

by using

## STANDARDIZED THREAD ROLLS

For Nos. 83 and 84 Brown & Sharpe Holders, Reed Series A Holders and other similar Type Single Roll Holders

Both tool engineers and purchasing departments appreciate the saving of time, effort and money made possible by being able to order Reed standardized thread rolls by type number only, without the necessity of submitting drawings and specifications.

ROLLS for COMMON STRAIGHT THREADS  
and TAPER PIPE THREADS  
**CARRIED IN STOCK**

For Your Convenience in Ordering  
Standardized Thread Rolls and Holders  
Write for Thread Roll Bulletin 1-17 and Price List

TM173

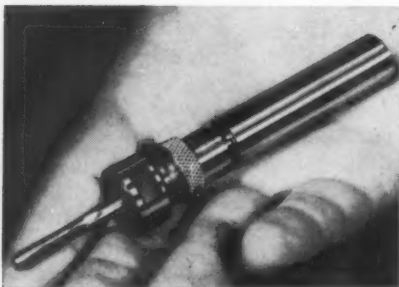


**REED ROLLED THREAD DIE CO.**

Specialists in Thread and Form Rolling Tools and Equipment  
Holden, Mass. U.S.A.

For more data circle 534 on Postpaid Card

**new equipment . . .**



**Releasing or Non-Releasing Tapholder**

on which they are used into precision tapping machines.

The self-feed feature of these tools, if employed, guarantees the production of gage perfect threads even when used for re-entry with finishing taps

for tapping in two operations. There is no thread distortion or double threading.

The length of pull out for releasing can be varied from a minimum of 1/16 to a maximum of 3/4 inch by a simple adjustment of the knurled depth control collar. Accurate thread depth is positively maintained by the adjustable releasing feature. This mechanism, activated by precision rollers, provides an extremely smooth release and is practically impervious to wear.

Designed so the major diameter does not exceed the shank diameter, the entire length of these tapholders, excluding only the Rubber-Flex Collet Nut, may be accommodated within the toolholder opening of the machine turrets.

Tapmatic Tapholders are available in the following tap capacities: 5/8 inch diameter from No. 0 to 12; 1 inch diameter from No. 0 to 1 1/2 inch; 1 1/4 inch diameter from No. 10 to 5/8 inch. For more data circle 184 on Postpaid Card

★ modern machine shop ★

## **ELECTRICAL DISCHARGE MACHINE**

Die blocks measuring 3 by 4 feet and weighing up to 6,000 pounds can be electrical-discharge machined by the Easco Die-Matic, available from Easco Products, Inc., Ann Arbor, Mich. It stands 7 feet high, weighs 3,500 pounds and occupied 81 by 103 inches of floor space, exclusive of the Rotary Impulse Generator and Mark III Electrical Power Pack.

The Die-Matic rough removes metal at 6 cubic inches per hour. Ratio of metal to electrode wear in the roughing operation is maintained at from 30:1 to as much as 50:1.

The Die-Matic is designed on the "building block" style and its versatility is such that electrodes as heavy as 500 pounds and as small as 0.005 inch diameter can be run on the same

... the Quality Line

STEEL  
**Stanho**  
PRODUCTS

*Stainless Steel*  
**TAPER PINS**

Complete stock, all sizes #7/0 through #14.  
Special sizes to order.  
Milled or Centerless Ground (Precision Type)  
Made to accurate tolerances.

Also "Stanho" Taper Pins made from selected screw stock, Monel, Brass, Aluminum or other metals. Clean bright finish—prompt shipments.

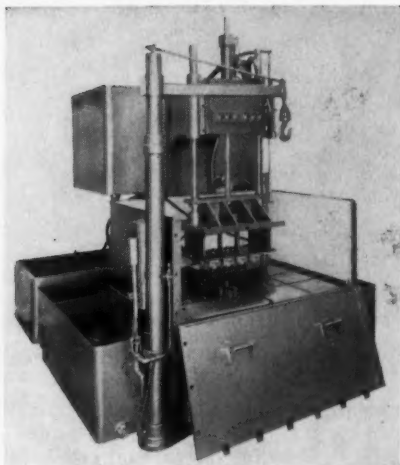
Write for description and prices.

2M-6

**STANDARD**  
SINCE 1872  
**HORSE NAIL CORP.**  
NEW BRIGHTON, PA.

For more data circle 535 on Postpaid Card





**Die-Matic Electrical Discharge Machine**

machine. A compound table can be added to the platen and such accessories as rotating attachments, centering microscope, tramping device, precision measuring equipment, etcetera can be added for the individual requirement.

The Easco Die-Matic is fully automatic, as the name implies. Controls can be set for the complete rough cutting and the machine left for the run, except for the replacement of the electrode. The same is true for the precision finish. In typical situations, one man can attend up to four Easco Die-Matics. Direct labor costs are thus importantly reduced.

For more data circle 185 on Postpaid Card

★ modern machine shop ★

#### **MOTOR DRIVEN MARKING FIXTURES**

A series of motorized G-R-D Marking Fixtures has been introduced by M. E. Cunningham Co., 1051 Chateau St., Pittsburgh 33, Pa. Supplementing the group of 20 hand operated fixtures previously available, the motorized

March, 1961

*Hardened, Tempered and  
Ground-from-the-Solid!*



*It pays to specify*

## **ACE DRILLS REAMERS BLANKS**

Premium Quality  
High Speed Steel,  
Solid Carbide and  
Carbide Tipped.

Call your local distributor today—or write Ace  
direct for latest catalog and price information.



**ACE DRILL**  
Adrian, Michigan

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS  
For more data circle 536 on Postpaid Card

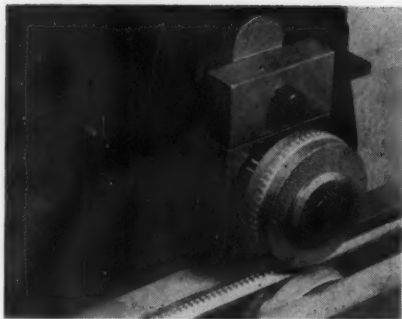
MODERN MACHINE SHOP 259

## **new equipment . . .**

G-R-D Units allow higher production rates with less fatigue to the operator—while making practical the marking of many parts not customarily marked.

The unit illustrated is the Motorized Style H Fixture which was developed for continuous marking along the full length of bar stock for screw machine processing. Lettering is spaced to provide one full symbol or trademark on each finished part made by the screw machine, eliminating need for marking parts individually. In this application, the marking die rotates at 58 r.p.m., allowing impressions to be made on the bar stock as close as 1/32 inch or as far apart as 1/16 inch.

Basic components of the Motorized G-R-D Fixture include: 1,750 r.p.m., 1/3 h.p. motor; single revolution, solenoid operated clutch for use in non-continuous marking operations;



**Cunningham Motorized G-R-D Marking Fixture**

marking roll with any desired symbols or lettering; T-handle for fine adjustment of marking depth; and cradle or mandrel for holding parts being marked.

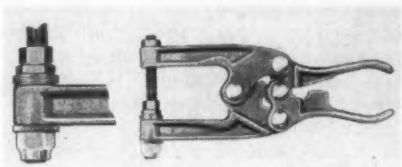
The Motorized G-R-D Fixture is available in 20 varied units for marking products ranging from screw machine stock through aluminum extrusions to special machined parts. Special modifications also can be developed by the company to suit specific needs.

For more data circle 186 on Postpaid Card

★ modern machine shop ★

## **LOAD INDICATING PLIERS GUARANTEE CLAMPING PRESSURES**

A newly developed industrial plier which permits the time-after-time application of a predetermined clamping force—regardless of the thickness



**Pliers guarantee clamping pressures**



## **NEW RADITURN**

**CUTS ANY RADIUS**  
**Convex, Concave or Ball**  
Patented

The accurate short cut for turning any radius.  
Adaptable to most any lathe.

Contact your tool supplier or write for details.

**RETCO MFG. & SALES**  
2115 N. Delaware St. • Indianapolis 2, Ind.

For more data circle 537 on Postpaid Card

of the work held—has been announced by Lapeer Mfg. Co., 3048 Davison Rd., Lapeer, Michigan.

This load indicating feature is available in four models of the plier, as well as in "C" clamp series, designed for 1,200 pounds maximum clamping force.

This metal-holding tool fills a long-time need in materials clamping, particularly where it is vitally important to reapply the same holding force to parts that are of varied dimensions.

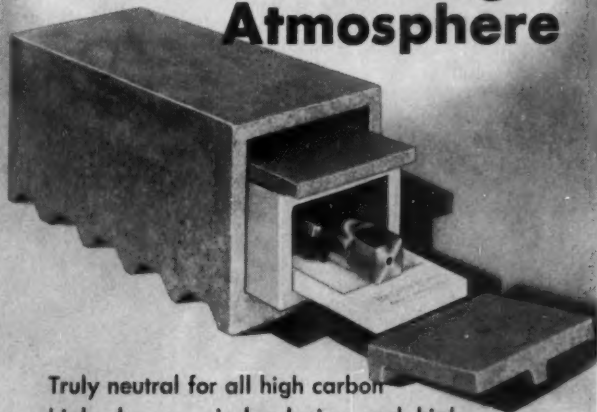
Heart of the plier is its "load indicating washer." In use, the adjusting spindle is set for the desired clamping force by trial clamping. When the right holding force is determined, the self-locking nut on the plier anvil is then adjusted so that the "load indicating washer" moves "just smoothly" with the plier clamped on the work. Thus, to duplicate an established clamping force on any other work thickness, it is only necessary to turn the adjusting spindle so that the "load indicating washer" again moves "just smoothly" after clamping.

For more data circle 187 on Postpaid Card

## TOOLHOLDERS AND CARBIDE INSERTS

Five-sided Kendex inserts with 10 cutting edges (Style PN) are used in Kendex Style KP tools, offered by Kennametal, Inc., Latrobe, Pa. These negative rake throw away inserts are regular pentagons with nose angles of 108 degrees, which add strength to the cutting points. The tools have been

## Sentry DIAMOND BLOCK<sup>®</sup> Tool Hardening Atmosphere



Truly neutral for all high carbon, high chrome, air hardening and high speed steels. Safe for your important tools.



Send for high speed furnace bulletin

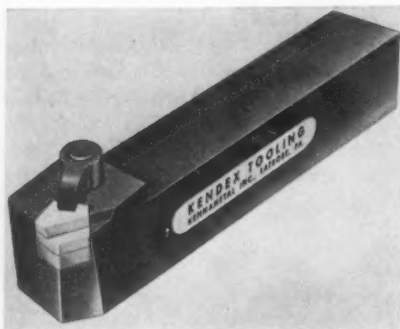
## Sentry

## ELECTRIC FURNACES

29-1

Request Catalog 2-D Write THE SENTRY CO., FOXBORO, MASS.  
For more data circle 538 on Postpaid Card

**new equipment . . .**

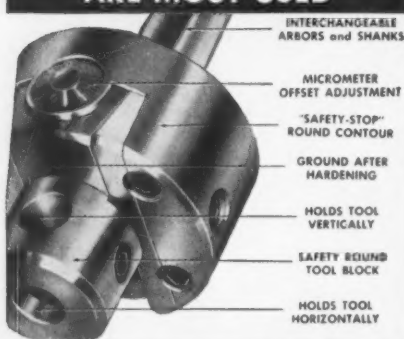


**Kendex Toolholder uses five-sided inserts**

designed with a 30 degree lead angle.

Two styles of toolholders are available from stock: Style KPD for general turning and Style KPF for facing. There are five sizes of toolholders for

**7 REASONS WHY  
FLYNN BORING HEADS  
ARE MOST USED**



**LEADING NAME IN  
BORING HEADS FOR 40 YEARS  
19 MODELS** Write for catalog

**FLYNN MANUFACTURING CO.**  
18301 WEAVER • DETROIT 28, MICH.

For more data circle 539 on Postpaid Card

262 MODERN MACHINE SHOP

each style of tool and three sizes of inserts, defined by inscribed circle  $\frac{3}{8}$ ,  $\frac{1}{2}$  and  $\frac{3}{4}$  inch in diameter.

Both precision and utility inserts are available.

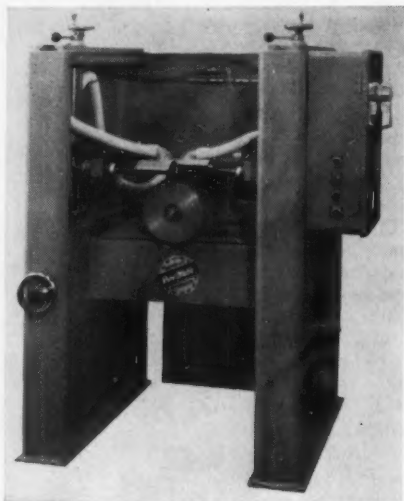
For more data circle 188 on Postpaid Card

★ modern machine shop ★

**DEBURRING MACHINE**

Deburring gears through a method employing a floating grinding wheel spindle, which follows the contour of gear teeth is, in all probability, the fastest method of performing this operation. Eliminating filing and the use of handwheels results in tremendous time savings.

The accompanying illustration shows the latest development in this field made by Davis and Thompson Co., 4460 North 124th St., Milwaukee 18, Wis. The machine uses two floating arms, so that both ends of teeth can be deburred simultaneously and operation completed after one revolution. Housings over grinding wheels



**View shows Roto-Matic Deburring Machine**

March, 1961

are the intake for the exhaust system, thereby eliminating the necessity for completely enclosing the machine and thereby allowing for free movement in handling workpieces.

For more data circle 189 on Postpaid Card

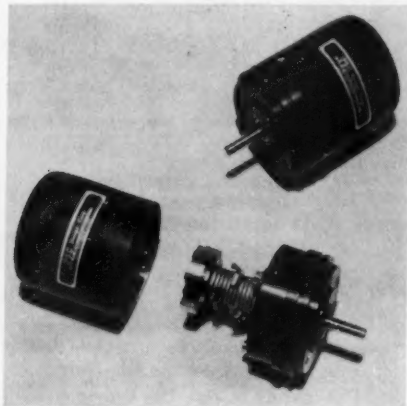
★ modern machine shop ★

### ADJUSTABLE LIMIT STOP ASSEMBLY

An improved precision limit stop assembly, providing fully adjustable rotational limit control within an operational range of 30 to 4,530 degrees, has been announced by PIC Design Corp., 477 Atlantic Ave., East Rockaway, New York.

Available from stock, the new assembly, in a 3/16 inch shaft size, is offered in ball or oilless bronze bearing types. Self-contained, in a black anodized case, 1 3/4 inches in diameter (Size 18), the new unit is readily adjusted by the setting of a series of washers, each governing 300 degrees of rotation. If desired, PIC Design will preset any unit to a specified stop, without charge.

For more data circle 190 on Postpaid Card



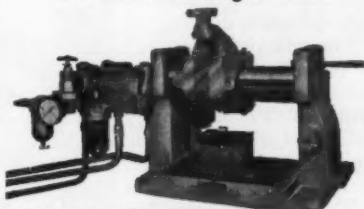
Improved Precision Limit Stop Assembly

March, 1961

## SHORTCUTS to MARKING

by the Low Cost "point of contact" method that reduces waste.

### Model 9 Pneumatic Marking Machine



A low cost marking machine powered by your regular air line 75 psi. and over. It marks parts, tools, sleeves, etc. of steel and also marks plastic with slight additional assembly. Write for Catalog No. 9.

### PERIPHERAL MARKING MACHINE Model 9AH



Marks precision calibrations and graduations around dials. Uses flat dies to mark rounds and roll dies to mark flats. A high production machine that will not break even brittle plastic parts. Write for Catalog No. 9AH.

Ask ACROMARK ENGINEERS which machines suit your marking need.

**ACROMARK**  
Company

9 Morrell St., Elizabeth, N. J.

"The Original Marking Specialists"

For more data circle 540 on Postpaid Card  
MODERN MACHINE SHOP 263

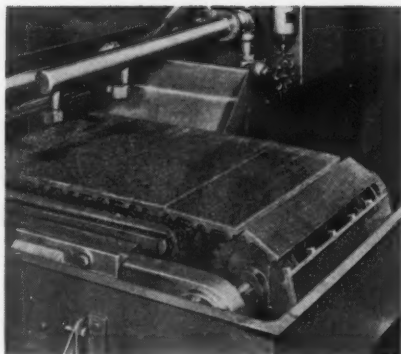
*new equipment . . .*

### CHAIN BLOCK CONVEYOR FOR OSCILLATING BELT GRINDER

Grinding a surface on a piece of practically any shape can now be done on a Tri-Matic Oscillating Belt Grinder by using a new chain block conveyor that is easily fixtured, according to the manufacturer, Sales Service Mfg. Co., 2361 University Ave., St. Paul 14A, Minnesota.

The conveyor drive can be arranged to reciprocate providing, in effect, a surface grinder that grinds the full width of the table at one pass. The fixtures can be bolted to the chain blocks, located on pins, against stops or in a number of other ways.

The solid base provided by the chain blocks is claimed to make it possible to hold extremely close tolerances, comparable to a surface grinder.



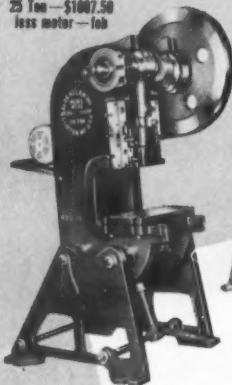
*The Tri-Matic Oscillating Belt Grinder*

The chain blocks can also be covered with neoprene or other material and operated as an endless conveyor for grinding, polishing and buffing flat parts and sheets.

It is also said that the ease and speed with which the abrasive belts can be changed makes it economical

## ALVA ALLEN <sup>Heavy</sup> <sup>duty</sup> PUNCH PRESSES

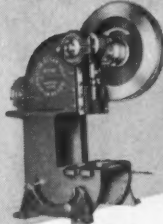
Model BT-25  
25 Ton—\$1007.50  
less motor—fob



Model BT-12  
12 Ton—\$437.50  
less motor—fob



Model BT-8  
8 Ton—\$299.50  
less motor—fob



Model BT-5  
5 Ton  
\$199.50  
less motor—fob



Model B-2—2-Ton  
\$97.50  
less motor—fob



**Powerful  
Dependable  
Economical  
Fully  
Guaranteed**

**Hundreds of different  
Model Combinations  
1 to 25 ton Capacities  
Moderate in price**

See your Supply Dealer or write for catalog giving complete information, specifications and prices on our line of Heavy Duty Punch Presses.

**Thousands in Use the World Over**

**ALVA ALLEN INDUSTRIES, Dept. MM**

**Clinton, Missouri • Tel. Turner 5-3331**

For more data circle 541 on Postpaid Card



to all types of operations from rough to finish, deburring to buffing, on one machine.

For more data circle 191 on Postpaid Card

★ modern machine shop ★

### **ADJUSTABLE VEE CENTERLESS GRINDING OUTBOARD SUPPORTS**

For centerless grinder users, Livingston Tool & Development Co., P. O.

Box 549, Belmont, Calif., announces a device to improve work or step up production.

The product is called a Tru-Grind Support. One is placed on the front (or "going-in" side) of the centerless grinder; one is also placed on the back (or "coming-out" side), as shown in the accompanying illustration. Each has two sliding jaws with thumb screws below for accurate adjustment of the individual jaws. The lock screws pro-

## **ALINA SERIES "W" BORE GAGES**

Range from .160" to 12"

Alina bore gages are extremely sensitive and designed for trouble-free operation. The three point centralization system locates the gage in the hole quickly and accurately. Alina bore gages will swiftly reveal taper, bell mouth, out of round, and other dimensional variations.

A push-button retracts the movable anvil for easy non-scratching insertion into the workpiece. This feature also saves wear on the anvils.

Each gage is equipped with tungsten carbide contact points for lasting on the job accuracy. (except model WO-1).

Bore gages with measuring depths up to 40" delivered on special order.

Model WO-1 available with measuring heads down to .160".

Furnished as a set complete with depth adjustment stops and fitted wooden case.



Completely enclosed gage head for greater protection against dust, etc.



WRITE FOR ILLUSTRATED LITERATURE

# **ALINA CORPORATION**

122 East Second Street, Mineola, Long Island, New York

For more data circle 542 on Postpaid Card

**new equipment . . .**



**Support on output side of centerless grinder**

vided will hold the jaws rigidly in place.

The brackets are fitted to the individual centerless grinding machine, regardless of size, make or model.

They will also permit a rough adjustment for all sizes of workpieces.

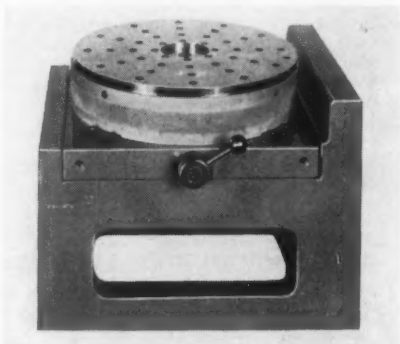
One man operates the centerless at an unusual saving in time and labor. Through-feed or spot, the workpiece is easily aligned to eliminate taper and control size from end to end. The workpieces do not fall from the centerless, but are removed in perfect alignment by Tru-Grind.

For more data circle 192 on Postpaid Card

★ modern machine shop ★

**ROTARY INDEXING TABLE  
GIVES 1/4 SECOND OF  
ARC ACCURACY**

A 7 inch diameter Milichex Rotary Indexing Table expands the recently announced line of precision indexing tables offered by Michigan Tool Co., 7171 East McNichols Rd., Detroit 12, Mich. It provides whole-degree angular indexing to an accuracy within 1/4 second of arc. Designed for smaller work, the Model MX-3600-7 inch Milichex is identical in operation to the larger models. Table top and base of the Milichex each have 360 ground and lapped teeth that mesh for positive positioning and locking. In operation, a lever is shifted to raise table. The top is then rotated to the desired angular position indicated by scale.



**7 Inch Milichex Rotary Indexing Table**

**UNEQUALLED**

**For Small Jig Boring Jobs!**



**LINLEY  
JIG BORER**

Made for small precision work found in all sized shops. Meets your most exacting requirements; releases large capacity borers for heavier jobs. Investigate the savings made possible with the Linley Jig Borer. An inquiry card mailed today will bring you detailed information promptly.

Table Size: 7" x 17 1/2"

Table Travel: 6 1/2" x 10"

**LINLEY BROTHERS CO.**  
661 State St. Ext., Bridgeport 1, Conn.

For more data circle 543 on Postpaid Card

The lever is returned to its original position, lowering and locking the table. Table will automatically lock into exact position due to the meshing of the 360 precision ground teeth. Wear is no problem, since accuracy will actually increase with wear as teeth lap each other.

For more data circle 193 on Postpaid Card

★ modern machine shop ★

### **SERIES OF 14 INCH SWING LATHES HAVE VARIABLE SPEED DRIVE**

A series of 14 inch swing lathes, featuring a variable speed drive of 40 to 1,400 r.p.m. and providing instant speed adjustment without shifting the belt, is introduced by Logan Eng. Co., Dept. L-261, 4901 West Lawrence Ave., Chicago 30, Illinois.

Lathes feature 14 $\frac{3}{8}$  inch swing over beds, 9 inch swing over saddle cross slides, center distances of 28 inches



View shows Logan 14 Inch Swing Lathe

and two precision ground vee ways and flat ways.

Hardened, ground steel spindle has a 1 $\frac{3}{8}$  inch hole and a draw-in collet capacity of 1 1/16 inches. It turns on four sealed and shielded ball bearings.



## INTERNAL CUTTING TOOLS

4 DISTINCTIVE STYLES  
IN CARBIDE & HSS

SIZES FROM  $\frac{1}{8}$ " UPWARD

Write for free complete catalog

### R. B. TOOL CO. INC.

340 Maple Ave., Westbury, L. I., N. Y.  
EDgewood 3-1382



**BORING**



**FACING**



**THREADING**



**RECESSING**



**SOLID SHANK TYPE**



**DETACHABLE HEAD TYPE**

For more data circle 544 on Postpaid Card

## **new equipment . . .**

A warp-free lathe bed with high, strong walls is braced by oversize ribs to withstand heaviest stresses.

The models are available with 2 1/4 inch-8 thread spindle and L-00 spindles and either with standard or hardened beds.

For more data circle 194 on Postpaid Card

★ modern machine shop ★

### **SANDER FEATURES NEW 5 INCH PAD**

National-Detroit, Inc., 2810 Auburn St., Rockford, Ill., states that the redesigned 5 inch pad on its "Dual Action" Sander offers many new improvements to users.

The new pad is ruggedly designed to take the heavy punishment that a sander gets in paint shops. Yet, with all its new ruggedness, the DA is no



*New 5 inch pad for Dual Action Sander*

heavier than before. This newly designed pad also permits sanding contours and up to right angles. The operator can now sand with the full area of the abrasive disc, as the attaching screw does not go through the pad.

National's "Dual Action" Sander provides a completely new sanding principal. It will scuff or remove old finishes and eliminates need for hand sanding of prime and surface coats. The abrasive grains travel in a non-repeating path. As a result, no heat is generated that will soften the paint and fill the abrasive. All varieties of abrasives may be used from coarse to No. 320 grit.

For more data circle 195 on Postpaid Card

★ modern machine shop ★

### **WIRE TESTER EMPHASIZES ECONOMY OF SPACE**

Cincinnati Sub-Zero Products, 3930 Reading Rd., Dept. S-1, Cincinnati 29, Ohio, announces the WU-100-24 for testing wire and cable under temperature conditions from plus 80 to minus 100 degrees F.; plus or minus 2 degrees Fahrenheit. The pulldown is accomplished in about 60 minutes. The specially designed chamber,

**ACCURACY is an ECONOMY!**  
and only precision offers you  
**HIGHEST QUALITY!**

**now is the  
time  
to put your  
OLD STEEL  
PARALLELS to "LIKE NEW"**



conditions and to be ready for the big push

For the first time Anton Machine Works offers to reground your old parallels to the following tolerances:

- Parallelism and straightness over length of 6"  $\pm .0001$
- Size tolerance between a pair  $\pm .00005$ . A complete list of new parallels in stock will be mailed on request.

### **ANTON MACHINE WORKS**

1225 FLUSHING AVE., BROOKLYN 37, N. Y.

For more data circle 545 on Postpaid Card

268 MODERN MACHINE SHOP

March, 1961



Cincinnati WU-100-24 Wire and Cable Tester

measuring 24 inches wide, 26 inches deep and 72 inches high, is penetrated by a self-supporting, cone-step mandrel which provides for testing on 2, 3, 4½ and 6 inch diameters. It may be used on the side or the back wall of the chamber, and the rugged pillow-block construction will accommodate a test load of ½ ton.

Two 2 inch ports, 12 by 12 inches, frost-free multipane window and interior illumination complete the appointments. The chamber incorporates a specially ducted, fin coil evaporator on the rear wall which allows unencumbered use of the entire test area.

The power pack operates on current requirements of 230 volts, 60 cycle, single phase and the overall dimensions are 34 inches wide by 36 inches deep by 86 inches high.

For more data circle 196 on Postpaid Card

★ modern machine shop ★

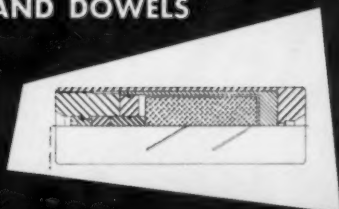
## LATHE SHIFTING MADE EASIER

"Servo-Shift" is a speed control unit that eliminates manual gear shifting.

It is a development of The R. K. LeBlond Machine Tool Co., Madison at Edwards Rd., Cincinnati 8, Ohio. It has been applied to the LeBlond NK design heavy duty lathes and will soon be made available on other heavy duty models. In addition to Servo-Shift, these lathes can also be equipped with Remote Apron Control and Digital Readout.

**Servo-Shift only**—On a dial on the headstock, the operator sets cutting speed opposite workpiece diameter and presses the shift button. The lathe automatically shifts gears and runs at the spindle r.p.m. which produces the selected f.p.m. If he chooses, the operator can select spindle r.p.m. instead of f.p.m. While making a pass on one diameter of the workpiece, f.p.m. or r.p.m. can be preselected for another diameter. When the tool is moved to the new diameter, all the operator has to do to maintain a correct cutting

## POLARIS EXPANDING ARBORS AND DOWELS



**ARBOR USES:** Accurately expanding arbors and devices for machining, grinding, gaging and other precision metalworking operations.

**DOWEL USES:** Removable dowels for die or machine construction. Expanding pins for fixtures and Expanding locating pins for gages.

Write for information to

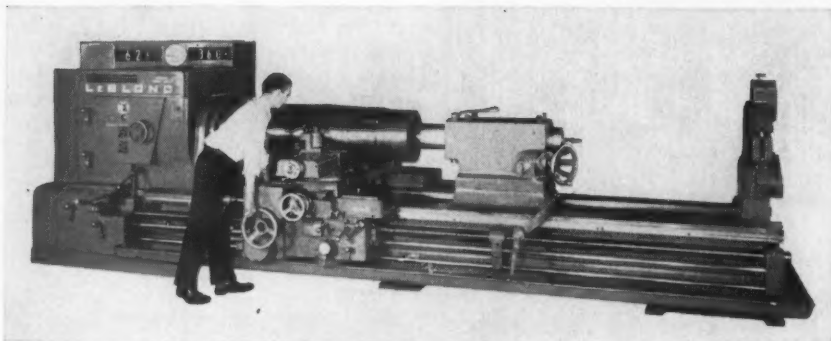
the GORDON N. CAMERON co.

10725 W. McNichols Rd. Detroit 21, Michigan

For more data circle 546 on Postpaid Card

MODERN MACHINE SHOP 269

**new equipment . . .**



**"Servo-Shift" increases operating ease on this LeBlond NK design heavy duty lathe**

speed is to press the shift button.

**Servo-Shift with Remote Apron Control** — Operation of a LeBlond Servo-Shift lathe can be further sim-

plified by the addition of a control station at the lathe apron. This station, a large drum dial, provides shift control and f.p.m. and r.p.m. selection. Apron Control is very desirable on long bed lathes, as it eliminates time wasting trips to headstock controls.

**Servo-Shift with Remote Apron Control and Digital Readout**—If the lathe is equipped with Digital Readout, an option available only with the remote Apron Control, the operator never has to guess when a change in r.p.m. is needed. A big, illuminated indicator is mounted above the headstock and shows the exact f.p.m. and r.p.m. being used.

For more data circle 197 on Postpaid Card



**FOR A Quality TYPE HOLDER**

Here's economy with no sacrifice of durability for heavy-duty, straight-line marking. Made of famous Meccano Safety Steel to prevent mushrooming and spalling.

Write for M-E-Conomy Bulletin No. 681.



**M-E-CONOMY TYPE HOLDER**

**M. E. CUNNINGHAM CO.**

1051 CHATEAU STREET, PITTSBURGH 33, PA.

For more data circle 547 on Postpaid Card

270 MODERN MACHINE SHOP

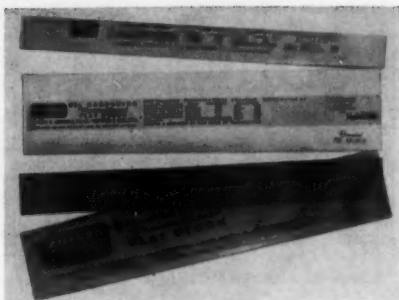
★ modern machine shop ★

**PRECOLORED AND OVERSIZE TYPES OF OIL HARDENING PRECISION GROUND FLAT STOCK**

The Henry G. Thompson & Son Co., Chapel and Will Sts., New Haven 5, Conn., announces that it is broadening its line of oil hardening precision ground flat stock with the addition of a precolored and oversize line.

March, 1961





"Milford" Precision Ground Flat Stock

Manufactured from a fine-grained, electric furnace steel, this oil hardening ground flat stock is supplied pre-colored to a deep blue-black—ready for immediate scribing or layout work. Thompson states that the precoloring process does not affect heat treating qualities or change the size of the stock—which is held to close toler-

ances. It also assists in preventing rust. Like the standard lines of "Milford" Ground Flat Stock, the pre-colored type is precision ground to a fine micro finish. Supplied in 18 and 36 inch lengths, it is available in a complete range of standard sizes.

Oversize material is used in making tools and parts where it is necessary to do finish work on the stock after forming and heat treatment and still produce a workpiece leaving a final dimension that corresponds to the fractional catalog size.

For more data circle 198 on Postpaid Card

✱ modern machine shop ✱

### MACHINE TOOL CONTROL

The accompanying illustration shows an advance in machine tool control which eliminates much of the mathematics in setup, normally associated with accurate jig boring work.

## MACHINE PRODUCTS PRECISION EQUIPMENT

- INCREASES ACCURACY
- SPEEDS SETUPS
- REDUCES REJECTS
- CUTS COSTS

You'll hold closer tolerances and increase efficiency, too, when you use Machine Products precision surfaces. Because the combination of superior materials, skilled craftsmanship and rigid quality controls in the manufacture of Machine Products equipment assures you of the precise dimensional accuracies you require. A complete line of plates and accessories is available, so send for your free catalog today.



### MACHINE PRODUCTS CORPORATION

6771 E. McNichols Rd.

Detroit 12, Michigan

For more data circle 548 on Postpaid Card

## new equipment . . .

It illustrates how simple it is for an operator to "dial in" coordinate dimensions of a workpiece, directly from a print to a Jigmil through the measuring system worked out for the machine by engineers of DeVlieg Machine Co., Fair St., Royal Oak, Michigan.

Called Diatrol, the system, through two direct reading dials, provides a means of preselecting coordinate dimensions for horizontal table movement and movement of the spindle head. Either positive or negative dimensions from any arbitrarily selected datum plane within range of the system can be dialed in. Then a push of a button automatically positions the table and spindle head in a matter of seconds. While the machine is cutting, the operator can preset for the next operation.

View at left, shows how the operator dials in plus or minus dimensions to

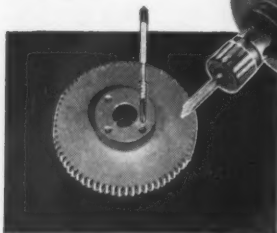


"Diatrol" Machine Tool Control System

position the spindle vertically; the one at right, indicates how horizontal settings of the machine table are dialed in. Shutters cover the minus set of figures when not in use to avoid errors through misreading. Measuring portion of the system also is capable of being calibrated to the ultimate in accuracy. The system is ideal for tool-room and experimental work, as well as "jigless boring" jobs.

For more data circle 199 on Postpaid Card

## COMMANDER TAPPER handles "IMPOSSIBLE" tapping job



**THE JOB:** Tap 4 6-32 holes 11/16" deep in the hubs of production run, heat treated gears.

**THE PROBLEM:** Excessive breakage of the specially relieved taps used to handle the unusual depth-to-diameter tapping job . . . spoiled parts . . . high

costs. A number of different tappers were tried, but the problem remained.

**THE SOLUTION:** A Commander Tapper was installed . . . adjustable torque control set to protect the tap and job was resumed.

**THE RESULT:** 1700 pieces were tapped without breaking a single tap. Tolerances were held and a very high rate of production was maintained. This is typical of the performance a Commander Tapper can produce.

The extreme sensitivity, and wide range of adaptability of a Commander Tapper can be put to work for you; ask your nearby Commander Distributor for a demonstration.

**Commander MFG. CO.**

4224 WEST KINZIE STREET • CHICAGO 24, ILLINOIS

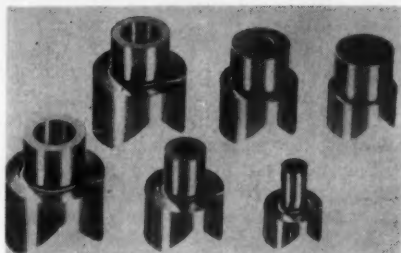
For more data circle 549 on Postpaid Card

## VEE BUSHING LINERS SELF-CENTER CYLINDRICAL, SQUARE, HEX STOCK FOR DRILLING

To enable precision drilling of cylindrical, square and hex stock, Acme Industrial Co., 200 North Laflin, Chicago 7, Ill., has developed and is now marketing vee bushing liners which provide automatic and accurate self-centering.

Hardened-ground vee bushing liners are designed for use with any type of cylindrical, square or hex stock drilling, either custom fixture or with standard fixture. Acting as a liner for removable bushings, the liner grooves itself dead center on stock to be drilled and permits center drilling, even near the ends of bars.

Packaged in a convenient-to-carry container or readily inserted into any tool box, these liners are produced in two sets of three bushings, one set of three with  $\frac{3}{4}$  inch o.d. and the other



Acme Industrial Vee Bushing Liners

set with varying o.d.'s. Both sets accommodate slip bushings with o.d.'s of 3/16, 5/16 and  $\frac{1}{2}$  inch in a range from No. 80 drill to 11/32 inch in A.S.A. or Acme standard sizes.

For more data circle 200 on Postpaid Card

★ modern machine shop ★

## MULTIPLE-HEAD FLAME CUTTER

Ty-Sa-Man Machine Co., Inc., 1101 White Ave., Knoxville, Tenn., an-

## GRIND: RADIUS—ANGLES on your SURFACE GRINDER

**MOST ACCURATE LOW COST DRESSERS MADE.**

**ONLY LOW COST DRESSERS WITH ALL WORKING & BANKING SURFACES GROUND SQUARE & TRUE FROM HOLES.**

**ADAPTERS TO FIT YOUR CYLINDRICAL GRINDERS**

### RADIUS DRESSER \$44.

Diamond \$8.



### Chatter Resistant, Spring Loaded Spindle

Hardened shaft—bearing adjustable for wear. Diamond always perfectly centered.

Easily set adjustable 180° stops.

**CAPACITY— $1\frac{1}{2}$ " convex to 4" concave.**

10" Wheel size for DoALL and NORTON Grinders—\$49. Diamond \$8.

14", 20", 24", in stock, low price.

**ORDER DIRECT**

on our 10 day  
money back  
guarantee

### ANGLE DRESSER & PRECISION ANGLE PLATE

\$49. DIAMOND \$8.



### Removable Angle Plate, precision ground on all six sides.

Chatter resistant, dust sealed, hardened slide. All surfaces precision ground or honed. Ball thrust bearing. Set easily and accurately. Large wheel capacity.

## The "Mighty Midget" Line

SPERMAN METAL SPECIALTIES • 2199A E. 21st ST. • BROOKLYN 29, N. Y.

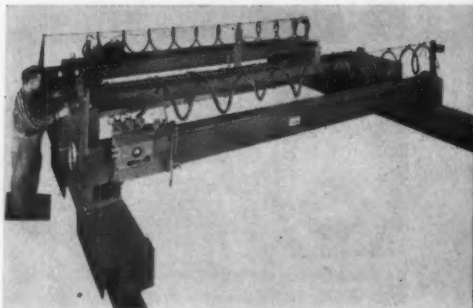
For more data circle 550 on Postpaid Card

### **new equipment . . .**

nounces the development of a low cost, gantry-type, multiple-head flame cutter that handles plate up to 20 feet wide up to any length.

The new cutter, which derives its economy from lightweight fabrication as opposed to heavy cast members, uses the standard Ty-Sa-Man saw gantry which is a production item with the company. It has an unlimited capacity for squaring large plate sizes, scarfing, beveling and edge preparation to close precision tolerances, and can be converted to a straight-line automatic welding rig.

The gantry unit is recommended for use with two end trimmers, which also travel on the rails with the gantry and provide cross-cut trimming by means



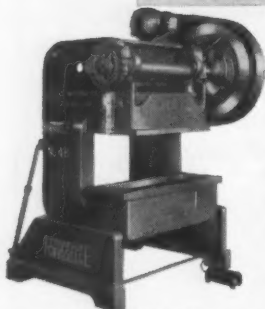
**Ty-Sa-Man Multiple-Head Flame Cutter**

of a movable blow pipe which travels along the transverse rail on roller bearings.

The gantry ripping unit can be fitted with up to eight variable angle blow

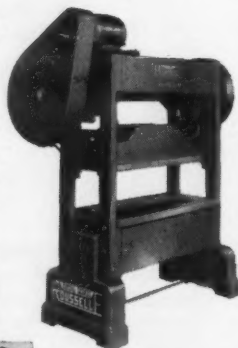
## **High-Output with ROUSSELLE**

### **DOUBLE-CRANK PRESSES**



No. 48 OBI with "Econo-Air" clutch.

**SPEED UP PRODUCTION** with these versatile 40-ton presses. Large bed and ram areas make them ideally suited to handle wide rolls or sheets . . . do multiple punching, steel-rule die work and other high output operations. For rapid, shockless starting and stopping, presses can be equipped with electrically controlled "Econo-Air" friction clutch . . . Ask for new catalog.



Choice of over 30 models and types in 5 to 60-ton sizes



**STRAIGHT SIDE**—Die space up to 24 in.; bed space up to 6 ft. between uprights.

### **SERVICE MACHINE COMPANY**

Mfrs. of Rousselle Presses

2310 WEST 78TH STREET • CHICAGO 20, ILLINOIS

Rousselle Presses are sold exclusively through Leading Machinery Dealers.

For more data circle 551 on Postpaid Card

pipes for production multiple cutting.

Track travel consists of a Thy-Mo-Trol infinitely variable speed drive through a synchronizing cross shaft and a rack and pinion drive to each rail. It is all pushbutton controlled with speed indicator in inches per minute feed, and has a 100 f.p.m. rapid traverse rate.

The tracks, available in any length, are 100 pound rail machined on top and sides for greater economy.

The end trimmers are moved down the tracks by a handwheel and are kept in absolute square by a rack and pinion drive and cross shaft.

This unit can be furnished with variable speed track drive for cutting in both directions.

For more data circle 201 on Postpaid Card

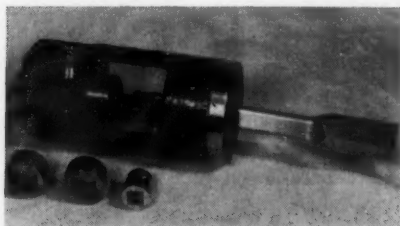
★ modern machine shop ★

### APPARATUS FOR MACHINING SQUARE HOLES

James E. O'Donnell, 15 Sparhawk Rd., Lynn, Mass., has developed a new method of machining square holes. It is a boring operation with a single pointed, non-rotating boring tool that can be done on a standard engine, turret or production type boring machine.

The fixture, consisting of a workholder equipped with a built-in roll guide, may be held in a four jaw chuck or on an adapter or a faceplate.

The boring bar, which is contoured



Typical Unit for square boring operation

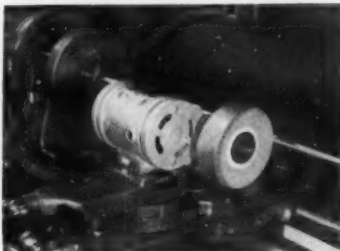
March, 1961

# THE MAC

## PRECISION TOOL POST GRINDERS

Featuring the circumferentially adjustable spindle assembly —

Mount on any machine tool — In any position — For the precise finishing of any material including ceramics —



Patented circumferentially adjustable spindle mounting makes it the only Tool Post Grinder permitting use of the grinding wheel on right or left side, front or rear of the motor unit.



- 14 Models  $\frac{1}{8}$  to 1 H.P.
- Spindle Speeds to 50,000 RPM
- Use Grinding Wheels  $\frac{1}{8}$ " to 6"
- Permanent Lubrication

Write for new catalog

### THE MCGONEGAL MFG. CO.

135 MOZART STREET

EAST RUTHERFORD, NEW JERSEY

Telephone GENEVA 8-2313

For more data circle 552 on Postpaid Card

MODERN MACHINE SHOP 275

## new equipment . . .

to give exact form to the hole, is fed through the guide into the workpiece by the forward movement of the tail-stock, turret or tool slide.

The method requires no adjustments to the guide or changes on the machine and makes a simple, timesaving operation of a difficult job.

For more data circle 202 on Postpaid Card

## FLEXIBLE ARM MACHINE LIGHT

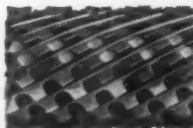
Rex Electric Mfg. Corp., 190 Berry St., Brooklyn 11, New York, announces the availability of the "Rexlight"—which is a flexible arm machine light with U. L. approved, wide range, adjustable swivel for either machine or bench lighting. The standard lamp will fit any machine. Custom-

made lamps are also manufactured to specifications in any length, size or finish, with either a metal or plastic shade.

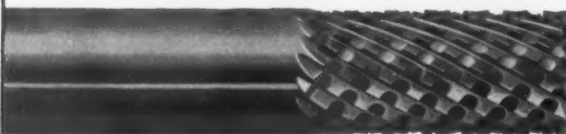
Any size bulb can be used in this machine lamp; it swivels 180 degrees; it has 15 inch flexible cable with tempered metal spring; universal mounting flange, and a 9 foot approved cord and plug.

For more data circle 203 on Postpaid Card

## DIXIE CARBIDE ROUT-O-MILLS



EFFICIENTLY ROUT, MILL AND TRIM THE  
HARDEST, MOST ABRASIVE **PLASTICS**



Custom designed Dixie Carbide Rout-O-Mills rout, mill and trim "hi-hard" plastics such as reinforced fibre-glass, melamine, Plexiglas, Expoxys and laminated plastics. Exclusive tooth designs provide much faster cutting speeds and considerably longer tool life.

Carbide Rout-O-Mills are available in  $\frac{1}{16}$  to  $1\frac{1}{2}$  inch diameters . . . and tooth designs in many contours are available. Send for Rout-O-Mill Bulletin.

Contact Dixie Tool Industries for machining and engineering assistance in plastics fabrication.

Complete Carbide Tool catalog available upon request.

**Dixie Tool Industries, Inc.**  
Bridgeport 3, Michigan.



100

For more data circle 553 on Postpaid Card



"Rexlite" Flexible  
Arm Machine Light



## FULL FLOW DISPENSERS

A line of heavy duty dispensers, available from Trico Fuse Mfg. Co., Milwaukee, Wis., delivers a full flow of oil or other liquids by gravity when valve is opened, through  $\frac{1}{4}$  inch o.d. nylon or metal tubing from a central location. The flow stops when the valve is closed. Trico or other single or multiple sight feed valves should be used for adjusting the rate of feed, since these dispensers have no means for feed regulation.

Two types are available. One is manually controlled by a shut-off lever at the top of the reservoir, the other is electric solenoid operated and is completely automatic. When energized, feed starts instantly. When current is shut off, feeding stops. The unit is made in five sizes; 10 ounce, 1 pint, 1



Type "D" Dispenser

quart,  $2\frac{1}{2}$  quarts and 1 gallon. Reservoir assemblies are solid brass, brush brass lacquer finished and are available with Pyrex glass or shatter-proof Lucite reservoir cylinders. Liquid supply is always visible. It can be quickly refilled through a large self-closing filler cap. Mounting stud and nut for easy installation are also incorporated. Units can be easily taken apart for cleaning.

For more data circle 204 on Postpaid Card

## Enco TOOL POST TURRETS

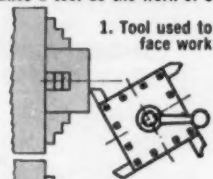
+ .0005"  
- .0005"

### Re-Indexing Accuracy Guaranteed!

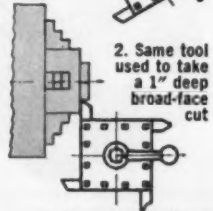


Put an Enco Turret on your lathe and get the accuracy, speed, and cost-cutting advantages that make Enco Turrets first choice of leading lathe builders. Get 12 station indexing—30°, 60°, and 90° from each of 4 tools... get smooth, effortless hand indexing... and capitalize on the advantages of Enco's exclusive, patented "O" Ring Seal that keeps indexing mechanism free of chips and dirt. There's an Enco Turret made to fit your lathe.

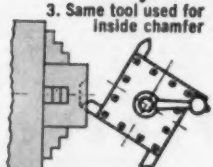
Makes 1 tool do the work of 3



1. Tool used to face work



2. Same tool used to take a 1" deep broad-face cut



3. Same tool used for inside chamfer

LATHE SWING	TOOL BLOCK SPECIFICATIONS	PRICES F.O.B. CHICAGO
(STANDARD)		
6"-12"	2½" sq. x 1¼" thick	\$ 37.00
10"-13"	3½" sq. x 1¾" thick	\$ 58.00
12"-15"	3½" sq. x 2½" thick	\$ 72.00
13"-16"	4½" sq. x 2¼" thick	\$ 78.00
15"-19"	4½" sq. x 2¾" thick	\$ 97.00
14"-20"	6" sq. x 3½" thick	\$165.00
(HEAVY-DUTY)		
14"-20"	4½" sq. x 3" thick	\$148.00
16"-24"	6½" sq. x 3¾" thick	\$215.00
18"-32"	7" sq. x 4¼" thick	\$255.00
20"-48"	7½" sq. x 4¾" thick	\$295.00

Note: Machineable Base T-Slot Turrets carried in stock

Write for catalog #53 and name of nearest dealer  
**Enco MANUFACTURING CO.**

Dept. # 131 4520 W. Fullerton Ave., Chicago 39, Ill.  
For more data circle 554 on Postpaid Card

## JIG GRINDING and JIG BORING to your specification

At your disposal: Our sub-contract jig boring department, one of the best equipped in the East.

**A. K. TOOL CO., INC.**

ROUTE 22, MOUNTAINSIDE, N. J.

Telephone: ADams 2-7300 Dlgby 9-1445, N. Y. C.

For more data circle 555 on Postpaid Card

## MASTERCRAFT TOOLS

### MODEL 800



Model 800 Compound Slide has 8" x 5" travel, 12" x 5 1/2" table. For small jig boring, precision cut-off, milling on drill press. **\$92.00**

### MASTERCRAFT ENGINEERING CO.

☐ P. O. BOX 4175 • RIVERSIDE, CALIF.

For more data circle 556 on Postpaid Card

## NEED TIGHT SPECS on your SHORT RUN STAMPINGS?



**FREDDY FEDERAL** Checks specifications every step of the way on every job! Our skilled short run stampings craftsmen and specialized equipment are geared to meet tough design problems . . . close tolerances. Whether your order is for a few pieces or in quantity—you'll receive uniform quality precision parts . . . delivered on time . . . right up to specs! Send us your print today for a quick airmailed quotation.

## FEDERAL | 3 PLANT LOCATIONS

**FEDERAL TOOL & MFG. CO.**

3615 Alabama Ave., Minneapolis 10, Minn. WEst 9-7843

**FEDERAL STAMPING CO.**

7315 Atoll Ave., North Hollywood, Calif. TRIangle 7-0542

**FEDERAL SHORT RUN STAMPING, INC.**

915 Lyell Ave., Rochester 6, N. Y. CLearwater 4-9523

For more data circle 557 on Postpaid Card

278 MODERN MACHINE SHOP

new equipment . . .

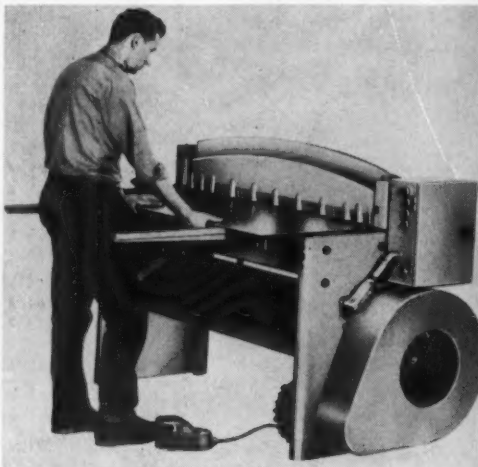
## POWER SHEAR WITH INCLINED RAM FEATURES SPLIT SECOND CYCLING

Cutting action that takes place within one fifth of a second is featured on a high speed power shear, introduced by O'Neil-Irwin Mfg. Co., 576 Eighth Ave., Lake City, Minnesota.

Called Di-Acro Power Shear No. 48, ferrous and non-ferrous material can be sheared to widths up to 50 inches and as heavy as 16 gauge mild steel at a rate of up to 160 s.p.m. Speed of the machine makes it adaptable for use on conveyor and run out lines.

Instantaneous cycling—no pause or hesitation — is possible because the shear is equipped with a self-adjusting electric clutch, built into the fly-wheel and connected directly to the motor by means of a triple vee belt drive. This eliminates gears and makes for quieter operation.

Shearing to die-accuracy is another advantage of the machine, as the ram is inclined, thus counteracting thrust.



Di-Acro No. 48 Power Shearing Machine

March, 1961

Shear blades are at an angle so that only the blade edge is in contact with the material.

Movable foot control with cord attached provides convenient placement and is particularly desirable when shearing full width sheets, as operator can stand to side of shear and trip clutch.

Material delivery chute can be adjusted to stack sheets on top of each other as they are sheared or to deliver sheared material to front or rear of machine.

Micrometer operated ball bearing back gage is graduated in 0.001 inch increments. Side of gage is also ruled to indicate nearest 1/16 inch.

A hold-down bar in front of shear blades operates automatically and acts both as a safety guard and material clamp. Hold-down has individual spring loaded feet to compensate for various thicknesses of material.

For more data circle 205 on Postpaid Card

★ m m s ★

## HEAVY DUTY LATHE

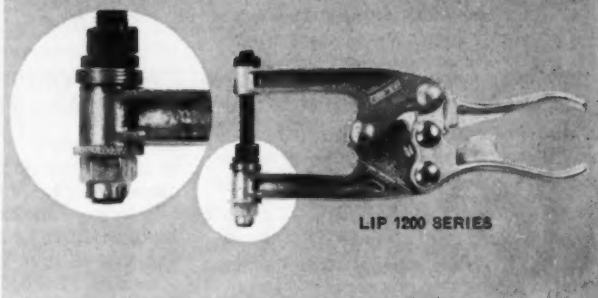
U. S. Industries, Inc., Clearing Div., 6499 West 65th St., Chicago 38, Ill.,

has introduced the 6040 Clearing-Axelson Heavy Duty Lathe, which is said to be one of the world's largest fabricated machines.

It can turn a part 40 inches in diameter. More than 66 feet in length overall, this lathe can turn a bar 50 feet long between centers.

Naturally, the lathe is built entirely of welded steel. It has been put together in two sections, each 30 feet—providing an easy method for shipment either by truck or by rail.

## NEW KNU-VISE LOAD INDICATING PLIERS GUARANTEE CLAMPING FORCE



These pliers are for applications where it is essential, and often critically so, that a certain clamping force be applied time after time—*regardless of the thickness of the work.*

In use, the adjusting spindle is set for the desired clamping force by trial clamping. When the proper force is obtained, the self-locking nut on the anvil is then adjusted so that the LOAD INDICATING WASHER moves "just smoothly" with the plier clamped on the work. Thus, once a certain clamping force has been established it can be readily duplicated on any other work thickness simply by adjusting the spindle so that the LOAD INDICATING WASHER again moves "just smoothly" after clamping.

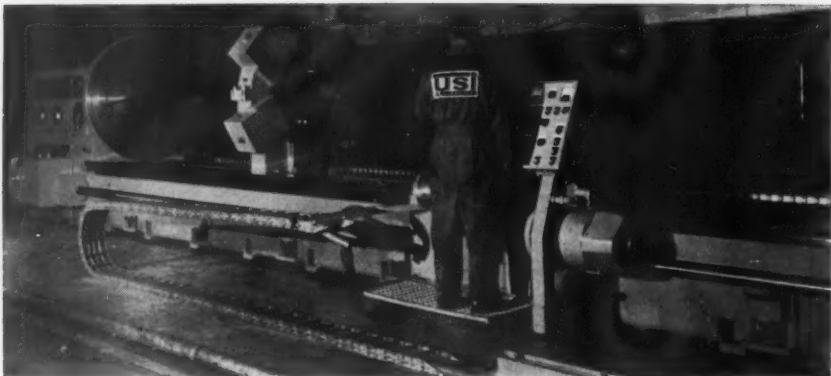
*Write for complete information on this time-saving model.*

Manufacturers of over 150 models of manually and air-operated clamps and pliers

<b>KNU-VISE PRODUCTS</b>	<b>LAPEER MANUFACTURING CO.</b>
3048 DAVISON ROAD LAPEER, MICHIGAN	WESTERN DIV.: PECK and LEWIS CORPORATION 4436 Long Beach Ave., Los Angeles 58, Calif., ADams 3-7148 CANADIAN DIV.: HIGGINSON EQUIP. SALES LTD. 1131 Pettit Road, Burlington, Ontario

For more data circle 558 on Postpaid Card

**new equipment . . .**



*Clearing-Axelson Lathe is said to be one of world's largest fabricated machines.*

Clearing's modular design is employed so that the headstock and bed are independent members, unitized in such a way that the entire structure is more rigid than if it were made in one piece.

The drive, electrification, quick change gear box and control console are also modular construction—removable as a unit—served as a unit.

An automatic lubrication system supplies both the bed and carriage ways with the proper lubricant at all times.

For more data circle 206 on Postpaid Card

## LINE OF FORM AND SHAVE TOOL BLANKS IS EXPANDED

As a result of the interest shown in form and shave tool blanks by manufacturers making their own dovetail tools, The Somma Tool Co., Inc., 120 Scott Rd., Waterbury, Conn., announces that it has now expanded its standard line of these blanks to some 40 items.

This represents a complete range of sizes in dovetail tools and also provides a choice of either soft blanks or hardened and ground blanks, as well as a choice of M-2 High Speed

**A Real Spring Winder!**



Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

No. 1 Capacity 0 thru 3/32" wire \$2.50  
 No. 2 Capacity 0 thru 3/16" wire \$4.00  
 No. 3 Capacity 0 thru 5/16" wire \$6.00

**HJORTH LATHE & TOOL CO.**  
 10 BEACON STREET WOBURN, MASS.

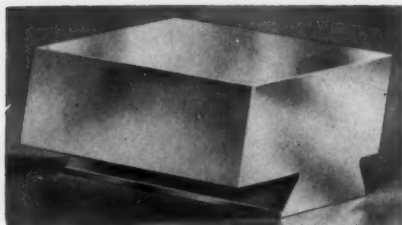
For more data circle 559 on Postpaid Card

280 MODERN MACHINE SHOP

<b>MAGNETIC BASE TOOL HOLDER</b>	<b>21 MAGNETIC TOOLS</b>	<b>PERMANENT MAGNETS VARIOUS SIZES AND TYPES</b>
<p>Indicator Holder—1/4" dia. non-magnetic stainless steel rod complete with 5/16" and 3/8" O. D. bushings. Fine precision adjustment identical to surface gage. Hardened ball socket setting permits universal positioning. Powerful 50-lb. pull magnetic base insures firm grip on any ferrous surfaces, curved or flat.</p> <p style="text-align: right;">Write for Catalog #958-A</p>		
<p><b>Model 2008—\$4.95</b></p> <p><b>CULLEN MFG. CO., INC.</b>          1603 Washington Ave., Racine, Wis.</p>		

For more data circle 560 on Postpaid Card

March, 1961



Tool Blank for automatic bar machines

Steel or T-5 Super High Speed Steel. These blanks can also be supplied in T-15 Vasco Supreme High Speed Steel as semi-standard, if required.

In announcing the new greatly expanded line of dovetail blanks, Somma is happy to advise the users of these tools that, because of increased production runs made necessary by the demand, they have been able to institute significant price reductions all along the line, thus increasing the savings already realized through Somma's quantity buying of tool steels and the elimination of costly toolmakers time in the preparation of the blanks by the user.

For more data circle 207 on Postpaid Card

★ modern machine shop ★

#### LINE OF AIR DRIVEN ASSEMBLY TOOLS

A line of Sioux air powered drills, screwdrivers and nutrunners has been introduced by Albertson & Co., Inc., Sioux City, Iowa.

Handles, motors, gear cases and clutches are interchangeable. A thousand different combinations are possible to assure that a tool exactly fits the job for which it is intended. Any one of the subassemblies can be quickly changed to convert a tool to a different need.

Of the many possible combinations, one pistol handle, lever handle and angle screwdriver, nutrunner and drill have been designated as catalog tools.

March, 1961

Another

## VICTOR VALUE

TOP QUALITY—LOWEST PRICES

Our Special Import . . .

### DIAMOND WHEEL DRESSERS

Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

Karat	Regular Price	Our New Price
1/4	\$ 6.00	\$ 2.85
1/2	12.00	5.00
3/4	21.00	7.50
1	30.00	10.25
1 1/2	54.00	15.00
2	75.00	20.00
2 1/2	102.00	26.00
3	130.00	32.00

These diamonds can be set in any shank to your specifications for \$1.00 each extra.

Order Today—Immediate Shipment from Stock!

**VICTOR MACHINERY EXCHANGE, INC.**

Dealers in Tool Room Equipment

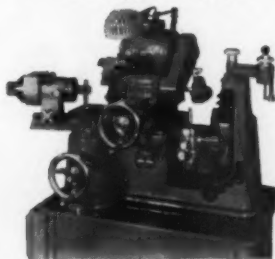
Dept. M, 251 Centre St.

New York 13, N. Y. Tel.: Canal 6-5575

For more data circle 561 on Postpaid Card

## HYBCO TAP GRINDER

Sharpens Chamfers, Flutes  
and Spiral Points



MODEL 1100

• Capacities No. 0 Machine Screw to 2 1/2" Hand Taps. Write for Catalog.

**HENRY P. BOGGIS COMPANY**

708 E. 163rd St., Cleveland 10, Ohio

For more data circle 562 on Postpaid Card

MODERN MACHINE SHOP 281

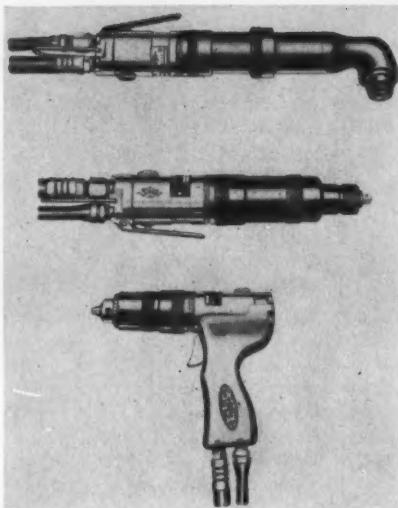


## new equipment...

These nine drills, screwdrivers and nutrunners are expected to cover most common applications.

These Sioux tools have been designed for long life and continuous duty on assembly lines, with a minimum of service and maintenance. Rotating parts are mounted on extra capacity ball bearings, rotors and spindles are finished to extreme accuracy for power and low air consumption, gears and pinions are oversize and correctly hardened for quietness and long life.

Air and oil exhausts from the base of the handle through a remote exhaust hose or deflecting silencer so that it can not be blown on the work. Motors have a built-in speed control and built-in reservoir for oil, when a line oiler is not used. The reservoir will hold enough oil, and automatically dispense it, for one day's operation.



New Sioux Air Driven Assembly Tools

The pistol grip handle is made of aluminum, with large cored air passages for free flow of air and to reduce weight. Position of the handle on the tool has been moved forward for better balance and control.

Three motors are available, single rotation (right hand), single rotation (left hand) and reversible. Speed control for maximum to zero is by slotted head valve in the center of the main valve. Direction of rotation in reversible units is controlled by turning the knurled knob. Changing direction of rotation does not disturb the speed setting, and power output is equal in either direction.

For more data circle 208 on Postpaid Card

★ modern machine shop ★

## COMPACT, CONVERTIBLE BAND SAW

Wells Mfg. Corp., 808 Tyler St., Three Rivers, Mich., has announced a modestly priced compact metal cutting



# TAPER PINS



For uniformity and accuracy our Taper Pins are unexcelled. They are milled from special screw machine steel bar stock (or stainless steel or brass), true to taper and to extremely close tolerances. Our leadership in the field enables us to provide all standard sizes from 7/0 to 14 for bulk or assortment shipment. In addition we can furnish, upon request, special needs such as screw ends and dowel pins.

Write for complete catalog giving information on taper pins. Woodruff keys, machine keys and gear rack.

**STANDARD STEEL SPECIALTY CO.**  
BEAVER FALLS      PENNSYLVANIA  
Plants: Beaver Falls, Pa.; Hammond, Ind.

For more data circle 563 on Postpaid Card



# How 45,000 companies help their employees buy security



## Hats off to American Industry!

"Industry's promotion of Payroll Savings has given the Bond program its greatest success," says William H. Neal, National Savings Bonds Director.



45,000 American business firms have put in a valuable service for their employees—the Payroll Savings Plan for U.S. Savings Bonds. Through this plan the company payroll clerk sets aside a certain amount for each participating employee, each payday. Bonds are delivered to employees as soon as they are fully paid for. It's fully automatic, and the easiest way in the world to save.

More than 8 million employees are using the plan, and are saving about \$2 billion in Savings Bonds a year. These funds have helped buy homes, finance vacations, assure college educations and provide nest-eggs for retirement.

If your company has not installed the Payroll Savings Plan thus far, contact your State Savings Bonds Director and have him show you how the Plan works. Get his experienced help in presenting the Plan to your organization. Or write Savings Bonds Division, U.S. Treasury Department, Washington 25, D. C.

ALL U. S. SAVINGS BONDS—OLD OR NEW—EARN  $\frac{1}{2}\%$  MORE THAN BEFORE



## MODERN MACHINE SHOP



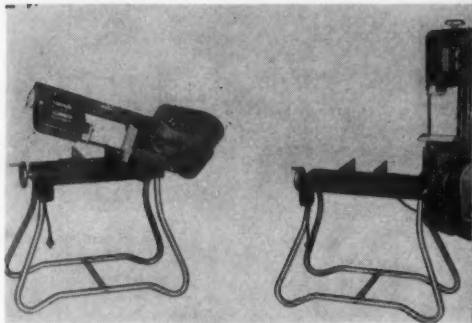
THE U.S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRONAGE, THE ADVERTISING COUNCIL AND THE BOND BOARD.

**new equipment . . .**

band saw. The Wells Model 300 is a dual purpose machine that can be used as a horizontal cut-off saw or as an upright band saw for cutting angles, slots, notches and bevels.

Maximum horizontal cutting capacity is  $3\frac{1}{2}$  by 6 inches for rectangular shapes,  $3\frac{1}{2}$  inch diameter (3 inch pipe) for rounds. Powered by a  $\frac{1}{4}$  h.p., 115 volt motor with a vee belt drive, it offers selective blade speeds of 54, 100 and 190 f.p.m. A positive screw action vise holds stock for horizontal cut-off work. Gravity feed and a switch, which automatically shuts the machine off at the completion of the cut, permit unattended operation. Overload protection is provided.

To convert to a vertical saw, the head is swung into a vertical position. The frame unit is equipped with a 4 by 6 inch integral work table. Throat



**Wells Model 300 Band Sawing Machine**

height is 7 inches and throat depth is 6 inches.

The Wells Model 300 takes only  $16\frac{1}{2}$  by  $38\frac{1}{2}$  inches of floor space. The bed measures  $6\frac{1}{2}$  by 24 inches. Overall height is  $34\frac{1}{2}$  inches with the frame horizontal, 51 inches with the frame in the vertical position. The top

The advertisement features a large, dark image of a tool, possibly a tap or die, with the brand name 'BUTTERFIELD' printed on it. Below the tool is a shield-shaped logo that reads 'BUTTERFIELD 100% INSPECTED TOOLS'. To the right, the words 'TAPS TAPS' are written in large, bold, sans-serif capital letters. Below this, the text 'FROM THE COMPLETE LINE' is written in smaller capital letters, followed by another large 'TAPS' in the same bold font. The background is dark with some light-colored geometric shapes.

For more data circle 565 on Postpaid Card

of the bed is 24 inches from the floor. The entire unit weighs approximately 110 pounds.

Bed and frame are exceptionally rigid fabricated steel. The entire unit is well guarded, yet the blade can be changed easily without removing a guard. Guide brackets, with ball bearing type guides, are rigidly mounted to the frame. Blade tension is controlled by a conveniently located knob at the end of the frame. Blade size is  $\frac{1}{2}$  by 0.025 by 60 inches.

Where complete mobility is desired for convenient jobsite use, an optional wheel and handle unit can be provided by the company.

For more data circle 209 on Postpaid Card

★ modern machine shop ★

#### **MULTI-PURPOSE LABORATORY FURNACE**

An automatic furnace, designated "Model No. UL3LF," has been devel-

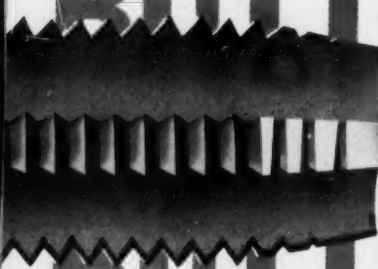
oped, field tested, approved by Underwriters' Laboratories and introduced into the market by the K. H. Huppert Co., 6841 Cottage Grove Ave., Chicago 37, Illinois.

The furnace is equally versatile as a multi-purpose unit in the industrial laboratory or for the low fusing of porcelain in the dental laboratory, at temperature ranges from 500 degrees F. up to a high maximum of 2,000 degrees F. with only 690 watts of power.

The bright, stainless steel furnace housing is fully lined with special high temperature insulation and constructed as an integral unit for easy removal from the base. A large capacity stainless steel preheat chamber, thoroughly insulated from the operating base, is provided for preheating or drying material prior to processing in the furnace chamber.

The work chamber, sized  $1\frac{3}{4}$  wide by  $1\frac{1}{4}$  high by  $2\frac{1}{4}$  inches deep, is

# **BUTTERFIELD BUTTERFIELD**



Like all tools in the complete Butterfield line, Butterfield taps are noted for precision performance, long life, and high value as production tools — not only when used individually but with other taps or cutting tools. Get these production benefits . . . through prompt deliveries and trained technical service in your machining operations . . . Call your Butterfield Distributor, Warehouses in Chicago, Detroit, Fort Worth, Los Angeles, New York and San Francisco.

# **BUTTERFIELD**

**DIVISION, UNION TWIST DRILL COMPANY, DERBY LINE, VT.**

# **BUTTERFIELD**

For more data circle 566 on Postpaid Card



**LOW COST  
SUBMERSIBLE  
COOLANT PUMPS**



These electric motor-driven impeller-type pumps operate efficiently partially or completely submerged. Pumps to within  $\frac{1}{8}$ " of bottom.

Recirculating, self-priming, no air supply required, easily adapted to any machine.

Write for complete details on this low cost coolant system.

**\$39.50**



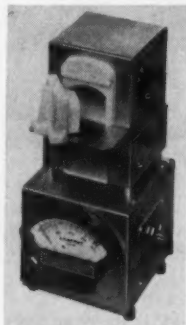
**DEVELOPMENT CO., INC.  
BRENTWOOD • MARYLAND**

For more data circle 567 on Postpaid Card

286 MODERN MACHINE SHOP

**new equipment . . .**

provided with a dense porcelain charging tray. Special high temperature, coiled alloy wire heating elements, supported by a cast refractory muffle shell, provide even heat distribution throughout the chamber. The tight-closing, hard-burned ceramic shell, plug-type chamber door is provided with a high insulating quality refractory core for high efficiency.



**Laboratory Furnace**

The bright stainless steel, ventilated furnace base provides the accessible operating panel for instrumentation. The automatic Huppert Infitrol with graduated dial and knob for convenient temperature setting is provided with an operating pilot light. A large type, easy-reading, equivalent C. and F. scale pyrometer is mounted on the front panel for convenience of the operator.

This UL3LF Furnace, with overall clearance dimensions of 8 wide, 11 high by 13 inches deep, can be readily moved to any desirable operating location for plugging into 115 volt, a.c. current supply.

For more data circle 210 on Postpaid Card

★ modern machine shop ★

**ELECTROLYTIC GRINDING  
SPINDLES AVAILABLE  
UP TO 3,000 AMPS**

Shown in the accompanying illustration are a new Pope "Anocut" Spindle for operation at 3,000 amps and a Pope "Anocut" Spindle for operation at 50 amps. These are two of a large number

March, 1961

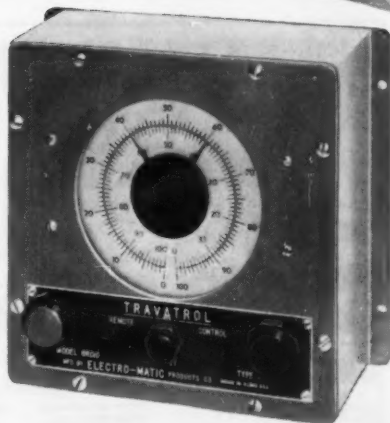


A LINEAR measuring and positioning control that eliminates the use of "dogs" on reciprocating machine beds, and traversing work heads.

A complete packaged unit with variable speed D. C. motor drive and three dimensional position systems. Available in a wide range of models.

TRAVATROL eliminates costly set-up time; it establishes and maintains a minimum distance of travel and point to point positioning over full range.

Dual adjustments are provided for minimum and maximum travel range.



*Write, wire or  
phone for additional  
information*

**ELECTRO-MATIC PRODUCTS CO.**

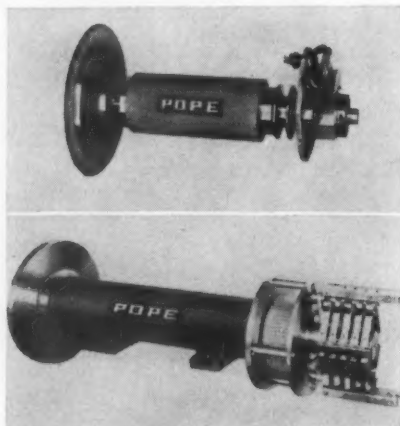
2235-7 N. KNOX AVENUE

CHICAGO 39

BE 5-4010

For more data circle 568 on Postpaid Card

**new equipment . . .**



**Pope "Anocut" Grinding Spindles**

and variety of Pope precision motorized and belt driven spindles arranged

for electrolytic grinding at all amperages within this range. Insulation is built-in and the spindles are equipped with a new, rugged, fork type brush assembly for cool operation.

These spindles are available from Pope Machinery Corp., 261 River St., Haverhill, Massachusetts.

For more data circle 211 on Postpaid Card

★ modern machine shop ★

**MILLING MACHINE VISE**

A completely new, 4½ inch milling machine vise has been introduced by the Wilton Tool Mfg. Co., Inc., 9525 Irving Park Rd., Schiller Park, Illinois.

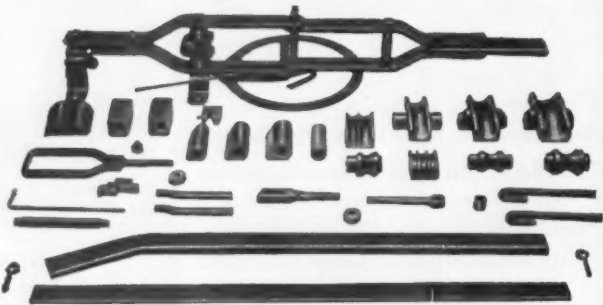
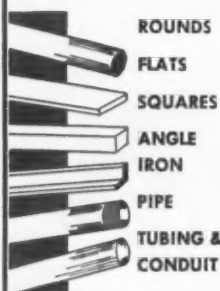
Wilton engineers and designers have made a break-through in the manufacture of this vise which is said to reduce its production costs by approximately 30 percent.

Among the features cited are: a generously proportioned coolant trough; a replaceable steel gib plate;

**1 MAN + 1 BENDER**

**BENDS ALL THESE:**

**HOSSFELD UNIVERSAL® IRON BENDER**



Bender Shown With Regular Equipment

**FREE!** WRITE FOR BULLETIN

**HOSSFELD MFG. CO.**

404 W. Third Street, Winona, Minnesota

• Wrenchless, ready to use. • Practical, quickly set up. • Adaptable, replaces special equipment. • Versatile, 147 different dies available. • Dependable, a must for maintenance, limited production. • Invaluable, optional equipment makes jobs easier.

For more data circle 569 on Postpaid Card





**BEFORE BRUSHING—**

*Brass and copper tubing ends have sharp edges and rough burrs after cut-off.*

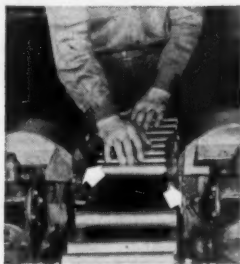


**AFTER BRUSHING—**

*Burrs and sharp edges are gone. Tube end-surfaces are smoothly, uniformly blended. And Osborn Power Brushing does the job up to 400% faster.*

## Bright idea for reducing costs

*... with OSBORN Power Brushing means 400% more parts per hour*



**HERE'S HOW IT'S DONE—***Simple, double-end brushing machine, using Osborn Master Wheel Brusher, has two power heads and central conveyor. Heads are adjustable to handle deburring and edge-blending of various tube lengths.*

**H**ERE'S how rough end-burrs are quickly, easily removed from metal components—and how this manufacturer does the job up to 400% faster with Osborn Power Brushing.

After the rough cut-off operation, cylindrical parts—like these tubes for example—are simply fed through a hopper . . . past rotating Osborn Brushes.

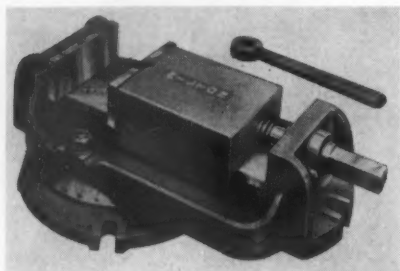
As the tubes are rotated by the action of the brushes, all burrs are thoroughly removed . . . tube ends are smoothly, uniformly blended.

In many cases, product quality is greatly improved at the same time costs are being cut with Osborn Power Brushing. An Osborn Brushing Analysis made on *your* production can show where and how you can save money today, too. Write The Osborn Manufacturing Company, Dept. B-33, Cleveland 14, Ohio.



Metal Finishing Machines . . . and Finishing Methods  
Power, Paint and Maintenance Brushes • Foundry Production Machinery  
For more data circle 570 on Postpaid Card

**new equipment . . .**



**Wilton 4 1/2 Inch Milling Machine Vise**

and reversible steel jaw faces (one side is a smoothly ground surface and the other has vertical and horizontal vee slots).

The vise comes in a stationary flanged base model or with a graduated swivel base. The stationary base unit weighs 50 pounds and has an overall

height of 4 3/4 inches. The swivel base model weighs 61 pounds. Both models open to 4 inches and have a jaw depth of 1 15/16 inches.

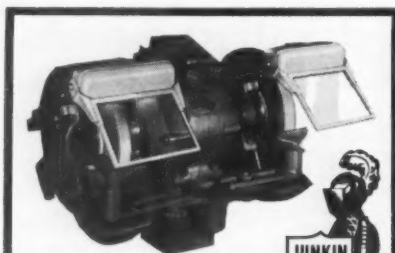
For more data circle 212 on Postpaid Card

★ modern machine shop ★

### **UNIVERSAL MOUNT, MINIATURE, HEAVY DUTY, AIR-HYDRAULIC CYLINDER**

A rugged, compact, heavy duty, 7/8 inch bore, miniature, 250 p.s.i. air, 2,500 p.s.i. hydraulic cylinder, ideal for jigs, fixtures and automation equipment where extra speed and stamina are called for and savings of space, cost and air are necessary, is available in 1 inch stroke spring return and 1, 2, 3, 5, 7 and 9 inch double acting models.

Power factor is 0.60, giving 60 pounds of force at 100 p.s.i.; 1,500 pounds of force at 2,500 p.s.i. Compactness and strength are achieved



### **The Shield which COMMANDS OPERATOR SAFETY**

This new shatter-proof Electro-Lock Shield, due to its interlocked power and light circuits, will not permit a machine to be operated when the Shield is not in a full protective position.

Write for complete information today.

**Junkin Safety Appliance Co.**

3121 MILLERS LANE • LOUISVILLE 16, KY.

For more data circle 564 on Postpaid Card

290 MODERN MACHINE SHOP

### **PRECISION TOOLMAKER'S VISE**

Precision ground to a maximum permissible error for squareness of .0006" per inch—NOT CUMULATIVE. Hardened throughout. Totally enclosed screw. Easy clamping to machine tables.



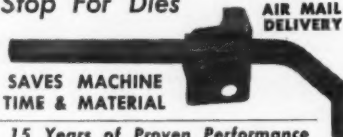
#### **PRICES**

1 1/4" Jaw . . . \$34.50  
1 1/2" Jaw . . . \$48.75  
2 1/2" Jaw . . . \$77.50

WRITE FOR LARGE COLOR PHOTO  
**NEWTOLS INCORPORATED**  
AMITYVILLE, NEW YORK

For more data circle 572 on Postpaid Card

### **WEST'S Positive Automatic Stop For Dies**



**SAVES MACHINE  
TIME & MATERIAL**

*15 Years of Proven Performance*

**SAFETY HARBOR TOOL & MFG.**  
BOX 364 • SAFETY HARBOR, FLORIDA

For more data circle 571 on Postpaid Card

March, 1961



# ACCURACY ASSURED

with  
**DI-ACRO PRECISION  
PUNCHES AND DIES**

## **Immediate Delivery from factory stock**

Accurate hole location is easily achieved with Di-Acro Precision Punch and Die sets because the centering point on the punch is ground concentric to the cutting edges, there is no "slop" even when several holes are punched in a blank. Hole sizes are accurate due both to the high degree of concentricity of the punch and die set and the choice of clearance which allows you to obtain clean, burr free holes no matter what material thickness is to be perforated. All Di-Acro punches and dies are precision made of high quality tool steel.

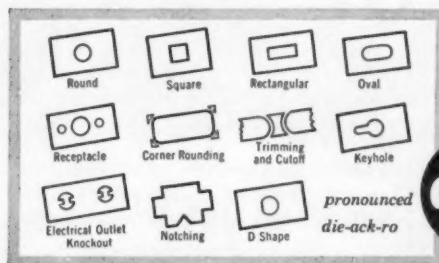
Over 500 standard sizes of Di-Acro Precision Punches and Dies in 12 standard styles are stocked. Punch Adapters and Die Holders are available to fit all styles of punch presses.

For multiple hole punching ask about the new Di-Acro Adjustable Punch and Die Sets.



For extra convenience and savings order Di-Acro Punch Paks—fitted steel chests containing 24 and 30 sets of punches and dies.

Consult phone book Yellow Pages under Machinery—Machine Tools for your Di-Acro distributor or write for catalog and prices.

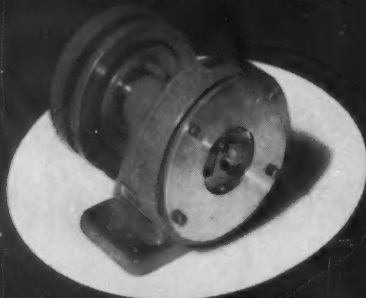


**O'NEIL-IRWIN  
MFG. CO.**

753 Eighth Avenue  
Lake City, Minnesota

For more data circle 573 on Postpaid Card

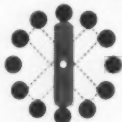
# SIZE POINT TAPER REDUCE



at high speed and low  
cost without wasting  
an ounce of metal, with

## BENCH MODEL SWAGERS

*Torrington Precision Swagers* will save time, money and material in countless forming and assembly operations in your metalworking shop. Write for complete information on our full line of swaging machines — large and small.



*largest maker and user  
of rotary swaging machines*

**ROTARY SWAGING MACHINES**

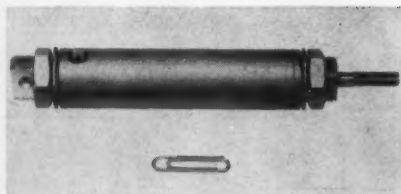
**THE TORRINGTON COMPANY**

Torrington, Connecticut

For more data circle 574 on Postpaid Card

292 MODERN MACHINE SHOP

### new equipment . . .



**7/8 Inch Bore Air-Hydraulic Cylinder**

through fine thread screw-together construction. All parts and seals are replaceable. Cylinders stud mount front or rear, clevis mount rear, or foot mount with nuts and lock washers supplied and inexpensive mounting accessories, which also include rod clevis and pin.

Internal cushions, for quiet, shock-free, long life operation, are of resilient Buna-N. Piston rods are high carbon steel, hard chrome plated, ground and polished. Shaft extension is 1 inch, threaded 1/4-28 by 3/4 inch. Shaft bushing is sintered bronze. Pistons on double acting models are brass; aluminum for spring return and are machined for perfect alignment after threaded rod is secured into piston.

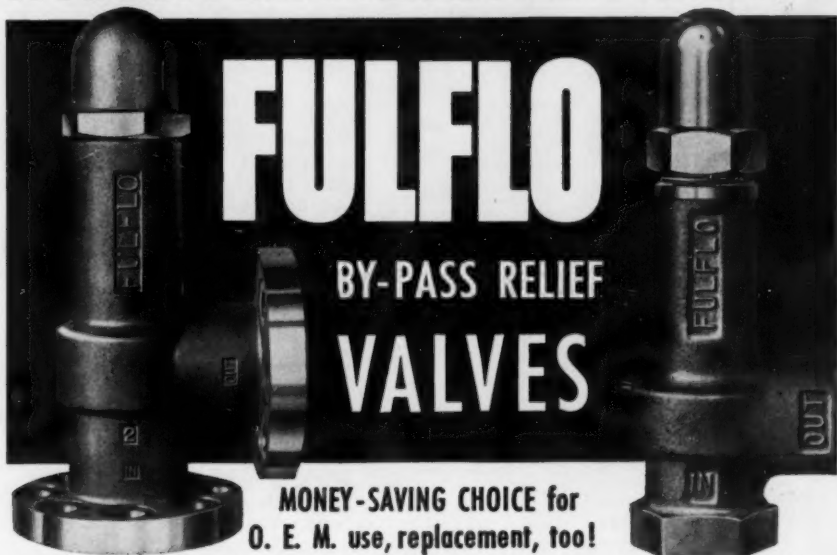
Cylinder tubes are machined from fine finished, hard drawn brass tubing, bright dipped for appearance and corrosion resistance. Piston seals are Buna-N "T" rings on double acting and self-adjusting block-vee on spring return. Shaft seals are Buna-N self-adjusting block vee, with backup rings on all double acting models. Ports are standard 1/8 inch NPT on cylinder side.

These cylinders are available from Clippard Instrument Laboratory, Inc., 7390-P Colerain Rd., Cincinnati 39, Ohio.

For more data circle 213 on Postpaid Card

March, 1961

# for **DEPENDABLE** **HYDRAULIC PRESSURE CONTROL**




## **FULFLO**

**BY-PASS RELIEF  
VALVES**

**MONEY-SAVING CHOICE for  
O. E. M. use, replacement, too!**

Low price and high quality make FULFLO piston-type hydraulic valves a natural O. E. M. choice. The service they deliver . . . quiet, dependable and trouble-free . . . makes them ideal from the equipment users' viewpoint.

- Screw or flange models . . . to 500 lbs. . . . for pipe sizes to 3"
- Steel, cast iron or brass bodies . . . brass, steel or stainless trim
- Fast shipment of standards . . . special to your requirements



**FOR EXTRA CONTROL CONVENIENCE**  
Where frequent pressure setting is needed, install a FULFLO Hand Wheel Valve; available in a wide range of types.

*Request complete catalog from:*  
**The FULFLO SPECIALTIES CO., Inc.**  
**416 Fancy Ave. Blanchester, Ohio**

For more data circle 575 on Postpaid Card



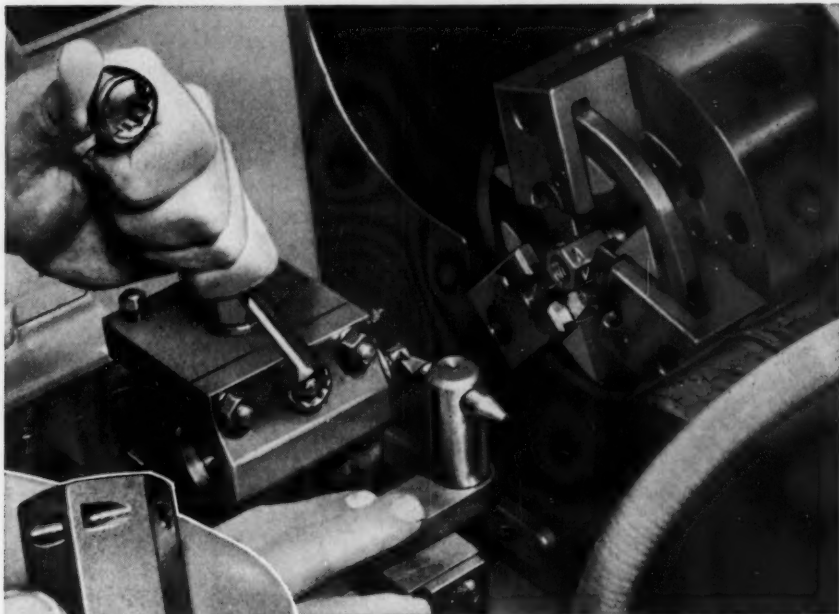
# Where to get it.

**Numbers shown are the page numbers of advertisements and new equipment write-ups which appear in this issue.**

- Abrasives, Grain, Cloth, Paper, Disc, etc.,** 29, 79, 215, 233  
**Actuators,** 87  
**Adapters,** 135, 187, 291, 307  
**Alloys,** 39, 121, 173, 177, 205, 206, 244, 270  
**Angles,** 271  
**Arbors,** 269  
**Bags, Shipping,** 243  
**Balancing Machines,** 15, 20  
**Bar Feeds, Pneumatic,** 248  
**Bar Stock,** 177  
**Barrel Finishing Equipment,** 247  
**Bars, Boring,** 60, 127, 212, 307  
**Bearings, Ball,** 76, 77  
**Bearings, Roller,** 76, 77  
**Bearings, Sleeve,** 31  
**Bearings, Thrust,** 76, 77, 252  
**Bending Devices,** 208, 288  
**Bending Machines,** 198  
**Bins,** 207  
**Bits, Tool,** 307  
**Blades, Cutting-Off,** 30  
**Blades, Shear,** 30  
**Blocks, Riser,** 271  
**Blocks, Vee,** 271  
**Boosters,** 167  
**Boring and Drilling Machines,** 169  
**Boring Heads,** 187, 212, 217, 219, 231, 262, 307  
**Boring Mills, Horizontal,** 244  
**Brakes, Press and Bending,** 28, 47, 51, 153, 243  
**Broaches,** 64  
**Broaching Kits,** 64  
**Broaching Machines,** 194  
**Brushes,** 289  
**Buffers, Bench and Pedestal,** 130  
**Buffers, Portable Pneumatic,** 97  
**Buffing Machines,** 130  
**Burners,** 83  
**Burs,** 121  
**Bushings, Ball,** 26, 31  
**Bushings, Drill Jig, Inside Front Cover,** 60, 87, 248  
**Bushings, Tap,** 232  
**Button Stem Machines,** 194  
**Cabinets,** 230  
**Calipers,** 191  
**Cams,** 212, 237  
**Carbides,** 32  
**Carriers, Tool,** 73  
**Centers, Lathe, Planer, Miller, etc.,** 74, 75, 148, 174, 223, 253  
**Centers, Test,** 27  
**Chasers,** 4, 73  
**Chip Breakers,** 13, 234  
**Chip Wringers,** 232  
**Chucks, Boring,** 60  
**Chucks, Collet,** 60, 214  
**Chucks, Floating,** 60  
**Chucks, Magnetic,** 52  
**Chucks, Power,** 295  
**Chucks, Rotary,** 52  
**Chucks, Scroll,** 295  
**Chucks, Tap,** 220  
**Clamp Components,** 60  
**Clamps,** 74, 75, 99, 164, 189, 224, 236, 279  
**Cleaning Tools, Machine,** 234  
**Collets,** 123  
**Comparators,** 211  
**Control Systems,** 169, 271, 287  
**Conversion Units, Press,** 208  
**Coolant Units and Systems,** 212, 236, 246, 256, 286  
**Coolants,** 7, 241  
**Counterbores,** 159, 231  
**Countersinks,** 30, 158  
**Couplings,** 252  
**Cradles, Drum and Barrel,** 213  
**Cut Off Machines,** 142, 254, 297  
**Cut Off Wheels,** 183  
**Cutters, Inserted Blade and Tooth,** 91  
**Cutters, Milling,** 72, 122, 159, 195, 276, 307  
**Cylinders, Hydraulic and Pneumatic,** 290  
**Deburring Machines,** 255, 262  
**Diamond Wheels,** 223  
**Diamonds and Diamond Tools,** 223, 281



# *Buck* chuck on Gisholt CRI-DAN helps make amazing savings



Photos — Acme Industrial Co., Chicago

## Smart production 467% faster!

The problem: a 20 NF Class 3 thread up to shoulder in bore on hex end of 440C stainless spool valve. Tapping was slow, breakage excessive . . . hardening shrunk and distorted threads . . . rejects as high as 20%.

The solution: A CRI-DAN lathe with a Buck compensating chuck, with internal pilot bushing, to center and grip work instantly for automatic taper threading with .4675" go—.4701" no-go precision. Result: 5.03 minutes saved per part . . . no rejects.

In your shop, too, you'll make money every time you chuck with Buck.

FREE catalog write —

**BUCK TOOL COMPANY**

314 SCHIPPERS LANE • KALAMAZOO, MICH.

For more data circle 576 on Postpaid Card

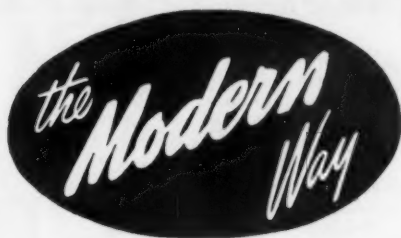
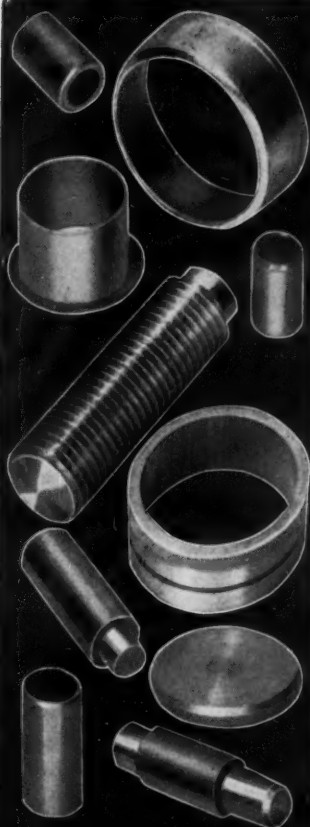
Makers of Scroll, Power,  
Dust Proof, Independent  
Chucks.

March, 1961

MODERN MACHINE SHOP 295

**where to get it . . .** (Numbers shown are page numbers in this issue)

- Die Buttons, 57  
Die Casting Machines, 197  
Die Cushions, Pneumatic, 204  
Die Filers, 236  
Die Heads, 73  
Die Lifting and Handling Machines, 160, 211  
Die Making Machines, 236  
Die Sets, 70, 224, 291  
Die Sinking Machines, 10, 11, 19  
Dieing Machines, 247  
Dies, Punching or Forming, 21, 55, 69, 89, 153, 159, 170, 291  
Dispensers, 277  
Dressers, Grinding Wheel, 281  
Dressing Fixtures, Grinding Wheel, 43, 74, 75, 233, 237, 273  
Drill Heads, 26, 131, 143, 144  
Drill Jigs, 174, 230  
Drilling Fixtures, 248  
Drilling Machines, Bench, 81, 131, 196  
Drilling Machines, Gun, 240, 305  
Drilling Machines, Horizontal, 169  
Drilling Machines, Multiple Spindle, 196  
Drilling Machines, Radial, 78, 157, 169, 252  
Drilling Machines, Sensitive, 131  
Drilling Machines, Turret, 34, 35, 56, 186  
Drilling Machines, Vertical, 81, 131, 157, 169, 196  
Drilling Units, 131, 246  
Drills, Center, Core, Twist, etc., 13, 23, 30, 33, 55, 159, 221, 223, 251, 259  
Drills, Hand, 131  
Drills, Portable Pneumatic, 97, 152, 214, 281  
Drivers, End Mill, 307  
Drivers, Motorized, 49  
Duplicating Attachments, 46  
Dust Control Equipment, 168, 175, 201, 238
- Electrical Discharge Machining**  
Equipment, 10, 11, 258  
End Mills, 139, 159, 171, 195  
Engraving Attachments, 66  
Engraving Machines, 19, 66  
Environmental Chambers, 220
- Fabricators, 21, 46  
Facing Heads, 127, 217  
Feed Fingers, 123  
Feed Units, 145, 228, 253
- Feeler Gage Stock, 189  
Files, 121  
Filing Machines, 54  
Finishing Machines, 289  
Flame Hardening and Cutting Apparatus, 273  
Flexible Shaft Equipment, 131, 144  
Fluids, Cutting, Front Cover, 7  
Forgings, 177  
Forming Machines, 153  
Furnaces, Heat Treating, 83, 179, 193, 221, 245, 261, 285
- Gage Accessories, 87, 191, 206, 265  
Gages, 39, 55, 61, 87, 159, 170, 188, 206, 209, 231, 265, 307  
Gears and Gear Units, 252  
Generators, 212  
Goggles, 226  
Grinders, Abrasive Band and Belt, 236, 264  
Grinders, Bench, 130  
Grinders, Cutter and Tool, 10, 11, 204, 205  
Grinders, Die and Mold, 152, 248  
Grinders, Disc, 130  
Grinders, Drill, 5, 131, 195, 237  
Grinders, Electrolytic, 237  
Grinders, Hand, 131  
Grinders, Hydraulic, 205  
Grinders, Jig, 43  
Grinders, Pedestal, 130  
Grinders, Portable Pneumatic, 97, 152, 242, 248  
Grinders, Profile, 236  
Grinders, Surface, 58, 59, 80, 134, 201, 204, 205  
Grinders, Tap, 281  
Grinders, Tool Post, 275  
Grinders, Universal, 36  
Grinders, Vertical Spindle, 36  
Grinding and Buffing Machines, Combination, 130  
Grinding Fixtures and Attachments, 134, 248, 265  
Grinding Wheels, 29, 59, 229  
Guns, Air, 230  
Guns, Spray, 181
- Hammer Molds, 251  
Hammers, Hand, 121  
Handles, Hammer, 251  
Handles, Machine, 210  
Handwheels, 210  
Hardness Testing Devices, 161, 216



## TO CUT OFF AND FORM TUBING AND BAR STOCK IN A SINGLE OPERATION

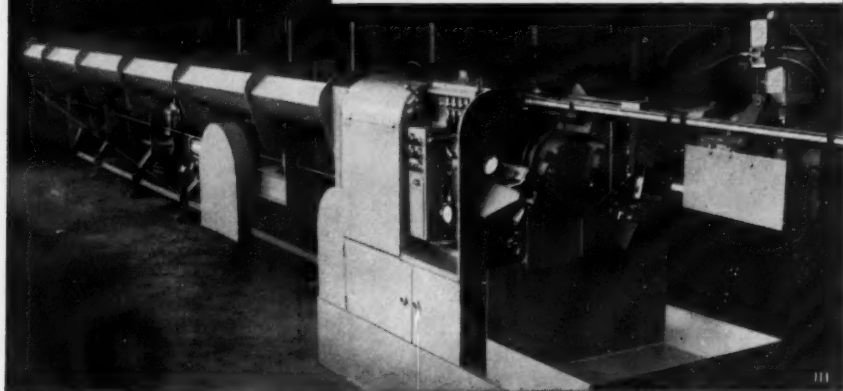
Here is a combination that feeds tubing and bar stock — automatically — to a fast, automatic cutting-off machine. Best of all, the pieces being cut off can be formed, grooved, flanged or chamfered at the same time.

There are models that handle tubing, pipe and bar stock from  $\frac{1}{8}$ " diameter up to solid bar stock of 3" OD and tubing up to 8" OD.

Why not investigate?

WRITE FOR CATALOG

**MODERN MACHINE TOOL CO.**  
2005 Losey St. • Jackson, Michigan



For more data circle 577 on Postpaid Card

**where to get it . . .** (Numbers shown are page numbers in this issue)

Hinges, 226  
Hobbers, Gear, 44, 45  
Hobbing Machines, 44, 45  
Hobs, 159  
Hoist Hooks, 165  
Holders, Die, 291  
Holders, Floating, 9  
Holders, Indicator, 280  
Holders, Magnetic Base, 280  
Holders, Roll, 257  
Holders, Tap, 9, 257  
Holders, Tool, 9, 60, 135, 139, 174, 233, 261, 307  
Holders, Tool and Blueprint, 207  
Honing Machines, 6, 93  
Hose Assemblies, Coolant, 252

Indexing Machines, 19  
Indicators, 39, 215, 240  
Iron Working Machines, 62

Jaws, Chuck, 123  
Jig and Fixture Components, 60, 87, 180  
Jig Bore, 43, 131, 209, 266  
Jigs and Fixtures, 185

Keys, Machine, 282  
Keys, Woodruff, 282  
Keyway Cutting Machines, 299  
Knives, 30  
Knives, Band, 39  
Knurlers, Hand, 216

Lapping Machines, 200  
Lathes, Automatic, 15  
Lathes, Bench, 199  
Lathes, Engine and Toolroom, 12, 16, 17, 28, 38, 40, 41, 65, 78, 199, 267, 269, 279

Lathes, Turret, 15, 50  
Layout Machines, 307  
Layout Materials, 24, 227, 237, 248  
Lighting Equipment, 217, 276  
Limit Stop Assemblies, 263  
Liners, Bushing, Inside Front Cover, 26, 273  
Lubricants, 48, 255  
Lubricants, High Pressure, 241

Machining Units, Portable, 131  
Magnets, Lifting, 82  
Magnifiers, 203

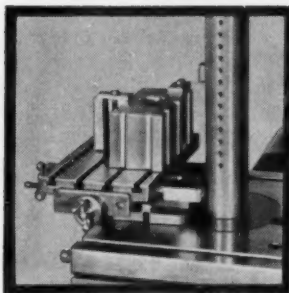
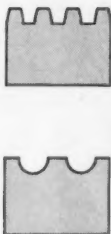
Marking Devices, 147, 227, 259, 263, 270  
Measuring Instruments, Optical, 182  
Measuring Instruments, Surface, 166  
Measuring Machines, Coordinate, 61  
Measuring Machines, Universal, 43  
Metallizing Equipment, 181  
Micrometers, 205  
Milling Fixtures, 211  
Milling Machines, Horizontal, 10, 11  
Milling Machines, Profile, 19  
Milling Machines, Turret, 163  
Milling Machines, Universal, 10, 11, 192, 250  
Milling Machines, Vertical, 10, 11, 163  
Mills, Rolling, 70  
Motors, 71  
Mounted Wheels and Points, 306

Nibblers, 69, 225, 232  
Notching Units, 202  
Nutrunners, Portable Pneumatic, 281

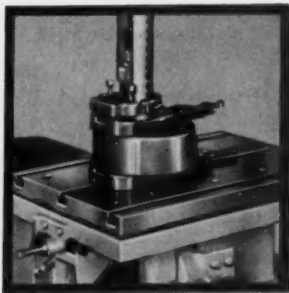
Oils, Quenching, 198  
Ovens, 221

Pantographs, 66  
Parallels, 271  
Parts, Machine Tool, Production, Aircraft, etc., 87, 185  
Penetrators, Diamond, Ball, etc., 161  
Piercing Units, 222  
Pins, Dowel, Taper, etc., 218, 239, 253, 258, 269, 282  
Plates, Angle, 271  
Plates, Floor, 271  
Plates, Layout, 271  
Plates, Sine, 87  
Plates, Surface, 87, 271  
Platforms, Air, 202  
Pliers, 260, 279  
Presses, Arbor, 27  
Presses, Automatic, 249  
Presses, Drawing, 51, 70  
Presses, Electric, 27  
Presses, Hydraulic, 27, 37, 172  
Presses, Power, 21, 25, 51, 70, 156, 213, 222, 224, 249, 253, 274  
Presses, Punch, 46, 162, 195, 264  
Presses, Straightening, 213  
Presses, Turret Punch, 42  
Projectors, Profile, 87  
Pulleys, 252  
Pumps, Coolant and Lubricant, 286, 303  
Punches, 21, 57, 69, 89, 190, 291

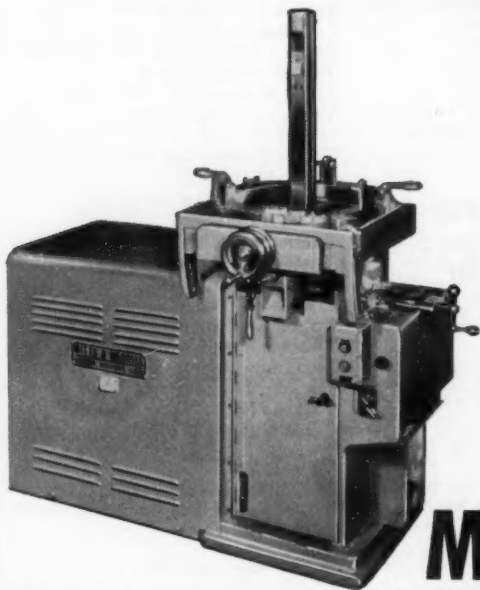
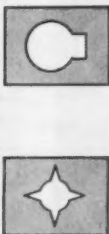
# PERFORM SPECIAL PRODUCTION JOBS ON HYDRAULIC **M&M** KEYSEATER AND VERTICAL CUTTING MACHINE



Set-up for external cutting



Set-up for internal cutting



The new Mitts & Merrill Keyseater and Vertical Cutting Machine can be easily adapted to cutting splines, serrations and die profiles both internal and external, by adding simple fixtures.

With combination tilting table and index table, straight or tapered bores and accurately spaced multiple keyways or splines may be cut at any degree of the circle, with internal keyways up to 3" wide x 24" long.

Hydraulic drive gives smooth performance and faster machining; stroke and feed as well as tool relief are automatic, assuring exceptional accuracy.

Mechanical drive keyseaters also available. Send us prints of your cutting problems.

BUILDERS OF MACHINERY  
SINCE 1854

## **M&M** KEYSEATERS AND VERTICAL CUTTING MACHINES

112

**MITTS & MERRILL • 1006 So. Water St. • SAGINAW, MICHIGAN**

For more data circle 578 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 299

**where to get it . . .** (Numbers shown are page numbers in this issue)

**Quills, 131**

**Racks, Gear, 282**

**Reamers, 30, 55, 95, 159, 195, 239, 259**

**Recorders, 216**

**Refractories, 29**

**Regulators, 219**

**Rings, Truing, 174**

**Riveting Machines, 214**

**Rolling Machines, 54, 256**

**Rolls, 70**

**Rolls, Threading, 257**

**Routers, 276**

**Safety Shields, Machines, 290**

**Sanders, Portable Pneumatic, 97, 268**

**Saw Blades, Band, 8, 39, 84, 121**

**Saw Blades, Hack, 39, 121, 229**

**Saw Blades, Hole, 39, 198**

**Saw Blades, Power, 229**

**Saw Blades, Slitting, 30**

**Sawing Machines, Band, 8, 54, 184, 225, 250, 282**

**Sawing Machines, Hack, 232**

**Screwdrivers, Portable Pneumatic, 281**

**Screws, Cap, Set, Socket and**

**Machine, 221, Back Cover**

**Screws, Transfer, 226, 234**

**Segments, Grinding, 59**

**Services: Milling, Grinding, Lapping,**

**Rebuilding, Repairing, Business, etc., 61, 70, 212, 237, 240, 248, 251, 268, 278**

**Shapers, 47, 199**

**Sharpening Machines, Drill, 237**

**Sharpening Machines, Saw, 14, 190**

**Shearing Machines, 28, 47, 51, 278**

**Shears, Squaring, Inside Back Cover**

**Shim Stock, 63, 189**

**Shims, 63, 189**

**Sine Bar Fixtures, 87**

**Slide Assemblies, 245**

**Sockets, 165**

**Spacers, 189**

**Spacing Collars, 189**

**Special Machinery, 19, 62, 70, 78, 185, 194, 250**

**Speed Reducers, 252**

**Spindles: Grinding, Boring, Milling, etc., 18, 87, 286, 308**

**Spray Equipment, 228**

**Spring Winders, 129, 280**

**Springs, 176, 210**

**Sprockets, 252**

**Squares, 271**

**Staking Machines, 22**

**Stampings, 189, 278**

**Steel, Bearing, 206**

**Steel, Die, 39**

**Steel, Tool, 39**

**Steel Stock, Ground Flat, 39, 121, 173, 270**

**Stops, Die Feed, 290**

**Straightedges, 271**

**Superfinishing Machines, 15**

**Swaging Machines, 292**

**Tables, Drill, 278**

**Tables, Elevating, 160, 211, 249**

**Tables, Milling and Grinding, 227**

**Tables, Rotary and Index, 43, 240, 250, 266**

**Tables, Work, 160**

**Tap Extractors, 235**

**Tap Guides, 220**

**Tapes, Pressure Sensitive, 29**

**Tappers, Automatic, 26**

**Tappers, Hand, 234**

**Tapping Attachments, 272, 301**

**Tapping Heads, 144, 254, 272**

**Tapping Machines, 154, 155, 242**

**Tapping Units, 131, 218, 272, 301**

**Taps, 4, 55, 144, 159, 170, 284, 285**

**Tool Blanks, 259, 280**

**Tools, Boring, 127, 187, 267, 275**

**Tools, Carbide, 30, 33, 91, 127, 144, 148, 159, 212, 259, 261, 267, 276, 307**

**Tools, Cutting Off, 185, 267, 307**

**Tools, Facing, 267**

**Tools, Grooving, 187**

**Tools, Recessing, 267**

**Tools, Rivet Upsetting, 27**

**Tools, Threading, 53, 187, 251, 257, 267**

**Torque Testers, 200**

**Tracers, Lathe, 149**

**Tubes, Collet and Pusher, 123**

**Tubing, Flexible Metal, 252**

**Turning Attachments, Radius, 260**

**Turning Machines, 65**

**Turrets, Lathe, Tool Post, Bed and Tailstock, 238, 277**

**Valves, 293**

**Vise Jaws and Stops, 74, 75**

**Vises, Bench and Machine, 60, 85, 174, 180, 288, 290**

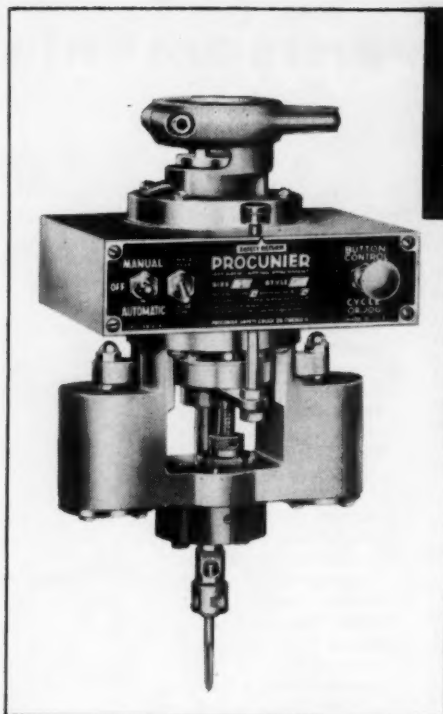
**Ways, Machine, 235**

**Welding Equipment and Supplies, 54, 179, 210**

**Wire Testers, 268**

**Wrenches, 164, 165**





## TAP GAUGE PERFECT PARTS *Everytime!*

### NEW LEAD SCREW TAPPER with PUSH BUTTON CONTROL

Now you can tap any quantity of practically any material, with absolute precision, without rejects, without stripped threads or distortion. Tests have shown it produces parts that pass 100% inspection—100% acceptable! The secret is in the tap control mechanism which feeds the tap automatically without any pressure. The Lead Screw controls the tap and guides it steadily through each cycle, guaranteeing supreme accuracy. In addition, it offers convenient 5-way operation, pushbutton and foot control for complete cycle or jog, automatic (without foot or hand controls) or with switch fixture for full cycle. Either way, you get uniformity, speed and precision that's unparalleled!

### SEND FOR FREE BROCHURES

giving the full story on this amazing new tapping unit and the complete line of regular tappers. See how you can enjoy higher quality tapping, less tap breakage, parts spoilage and increase tapping efficiency—for less cost! Write today!



# ---Procunier---

PROCUNIER SAFETY CHUCK CO.

12 S. Clinton St., Chicago 6, Ill. Dept. 3

Gentlemen: Please rush me your FREE brochures on the new Lead Screw Tapping Attachment and your line of regular tappers.

Name

Address

City  Zone  State

For more data circle 579 on Postpaid Card

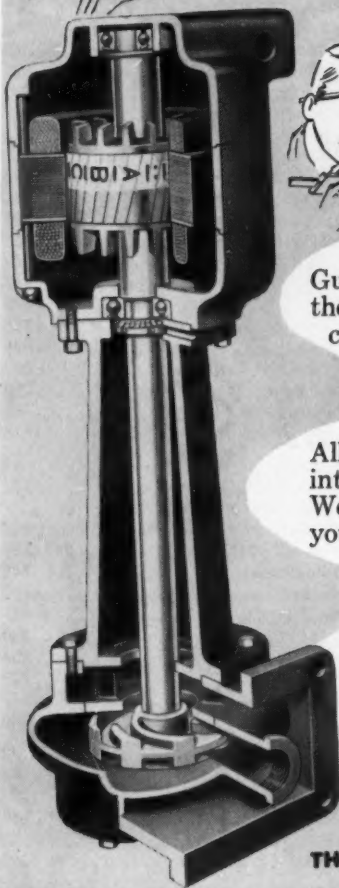
# INDEX to advertisements

A. K. Tool Co., Inc. ....	278	Buck Tool Co. ....	295
Aaron Mchry. Co., Inc. ....	28	Buffalo Forge Co. ....	62
ACCO Equipment Div., American Chain & Cable Co., Inc. ....	27	Butterfield Div., Union Twist Drill Co. ....	284, 285
Ace Drill ....	259	Byco Industries ....	232
Acme Industrial Co. ....	49	Cam Services Co., Div. of Himoff Machine Co. ....	212
Acme Tool Corp. ....	251	Cameron Co., Gordon N. ....	269
Acromark Co. ....	263	Carlton Machine Tool Co. ....	169
Adjustable Clamp Co. ....	236	Cerro Sales Corp. ....	244
Aget Mfg. Co. ....	175	Chicago Gear Wks. ....	252
Airetool Mfg. Co. ....	97	Chicago Heights Steel Co., Speedicut Div. ....	13
Airway Pump & Equipment Co. ....	230	Chicago Mfg. & Dist. Co. ....	241
Alina Corp. ....	265	Chicago Quadrill Co. ....	142
Allegheny Ludlum Steel Corp. ....	32	Cincinnati Gilbert Machine Tool Co. ....	240
Allen Industries, Alva ....	264	Cincinnati Milling Machine Co. ....	10, 11
Allison-Campbell Div., American Chain & Cable Co., Inc. ....	183	Cincinnati Milling Machine Co., Cincinnati Milling Products Div. . First Cover	
Alpha Molykote Corp. ....	255	Cincinnati Shaper Co. ....	47
American Chain & Cable Co., Inc., ACCO Equipment Div. ....	27	Circular Tool Co. ....	30
Allison-Campbell Div. ....	183	Clausing Div., Atlas Press Co. ....	81
Wilson Mechanical Instrument Div. ....	69, 161	Cleereman Machine Tool Co. ....	56
American Drill Bushing Co., Inc. . Second Cover		Cleveland Crane & Engr. Co. ....	51
American Tool Wks. Co. ....	78	Cleveland Punch & Shear Wks. Co. ....	21
Anderson Bros. Mfg. Co. ....	213	Clipper Diamond Tool Co. ....	223
Anton Machine Wks. ....	268	Columbia Tool & Die Wks. ....	242
Armstrong-Blum Mfg. Co. ....	8	Columbus Die-Tool & Machine Co. ....	185
Armstrong Bros. Tool Co. ....	99	Commander Mfg. Co. ....	272
Atlas Press Co., Clausing Div. ....	81	Comtor Co. ....	188
Auto Moulding & Mfg. Co. ....	226	Continental Machine Co. ....	254
Avey Div., Motch & Merryweather Mchry. Co. ....	186, 253	Cook Lead Hammer Service ....	251
Bar Products Co. ....	212	Cramer Controls Corp. ....	22
Barber-Colman Co. ....	16, 17	Cratex Mfg. Co. ....	215
Bardons & Oliver, Inc. ....	50	Criterion Machine Wks. ....	187
Barnes Co., Inc., W. O. ....	84	Cullen Mfg. Co., Inc. ....	280
Bear Mfg. Co. ....	20	Cunningham Co., M. E. ....	270
Bearings, Inc. ....	76, 77	Danly Machine Specialties, Inc. ....	224
Bellows-Valvaire Corp. ....	71	Dayton Rogers Mfg. Co. ....	24
Benchmark Mfg. Co. ....	162	Delta Power Tool Div., Rockwell Mfg. Co. ....	38
Blanchard Machine Co. ....	59	Denison Engr. Div. ....	172
Bliss Co., E. W. ....	70	Desmond-Stephan Mfg. Co. ....	85
Boggis Co., H. P. ....	281	Detroit Reamer & Tool Co. ....	33
Bokum Tool Co. ....	135	Detroit Stamping Co. ....	189
Boyar-Schultz Corp. ....	80	DeVlieg Microbore, Div. of DeVlieg Machine Co. ....	127
Branch Mfg. Co. ....	220	Dixie Bearings, Inc. ....	76, 77
Brightboy Industrial Div., Weldon Roberts Rubber Co. ....	79	Dixie Tool Industries, Inc. ....	276
Brown & Sharpe Mfg. Co. ....	122		

# Gusher

COOLANT PUMPS

GIVE 2 YOU 4 PART HARMONY



## IN DESIGN ...

Gusher Pumps contain no seals, pre-lubricated heavy duty ball bearings reduce maintenance to a minimum.



## IN WORKMANSHIP ...

Gusher Pumps are precision built; there is no metal to metal contact within the pump.



## IN SERVICE ...

All of us at Ruthman are interested in your business. We want to earn it by giving you the best *service* at *all times*.



## IN EFFICIENT OPERATION ...

on your machine. Follow the leading machine tool builders; specify GUSHER Coolant Pumps.



THE **Ruthman**  
MACHINERY CO.

1817 Reading Rd.  
Cincinnati 2, Ohio

For more data circle 580 on Postpaid Card

Dreis & Krump Mfg. Co.	153
duMont Corp.	64
Dumore Co.	131
Durant Tool Co.	253
Dykem Co.	227
Eastern Machine Screw Corp.	73
Eclipse Counterbore Co.	91
Economy Engr. Co.	160
Edroy Products Co.	203
Eisler Engr. Co., Inc.	237
Electro-Matic Products Co.	287
Electro-Mechano Co.	246
Ellisco, Inc.	237
Empire Tool Co.	9
Enco Mfg. Co.	277
Ex-Cell-O Corp.	87
Federal Tool & Mfg. Co.	278
Fellows Gear Shaper Co.	44, 45
Field & Son, Inc., W. W.	211
Field Tool Supply Co.	55
Flick-Reedy Corp., Miller Fluid Power Div.	167
Flynn Mfg. Co.	262
Fortune Industries, Inc.	247
Fosdick Machine Tool Co.	34, 35
Fulflo Specialties Co., Inc.	293
Fulmer Co., C. Allen	6
Gaertner Scientific Corp.	182
Gallmeyer & Livingston Co.	204, 205
Gammans-Hoaglund Co.	239
Gisholt Machine Co.	15
Gorton Machine Co., Geo.	19
Grant Mfg. & Machine Co.	214
Graymills Corp.	236
Green Instrument Co., Inc.	66
Grob, Inc.	54
Hamilton Tool Co.	154, 155
Hammond Mchry. Builders, Inc.	5
Hardinge Brothers, Inc.	12
Harig Mfg. Co.	134
Havir Mfg. Co.	222
Heimann Mfg. Co.	226
Heinrich Tools, Inc.	180
Heuser Mfg. Co.	230
Hjorth Lathe & Tool Co.	280
Holo-Krome Screw Corp.	Fourth Cover
Homestrand Machine Tool Corp.	157
Hones, Inc., Chas. A.	83
Hossfeld Mfg. Co.	288
Houghton & Co., E. F.	7
Huppert Co., K. H.	221
J & S Tool Co., Inc.	74, 75
Jarvis Corp.	144
Jeon Mfg. Co.	237
Jiffy Mfg. Co.	243
Junkin Safety Appliance Co.	290

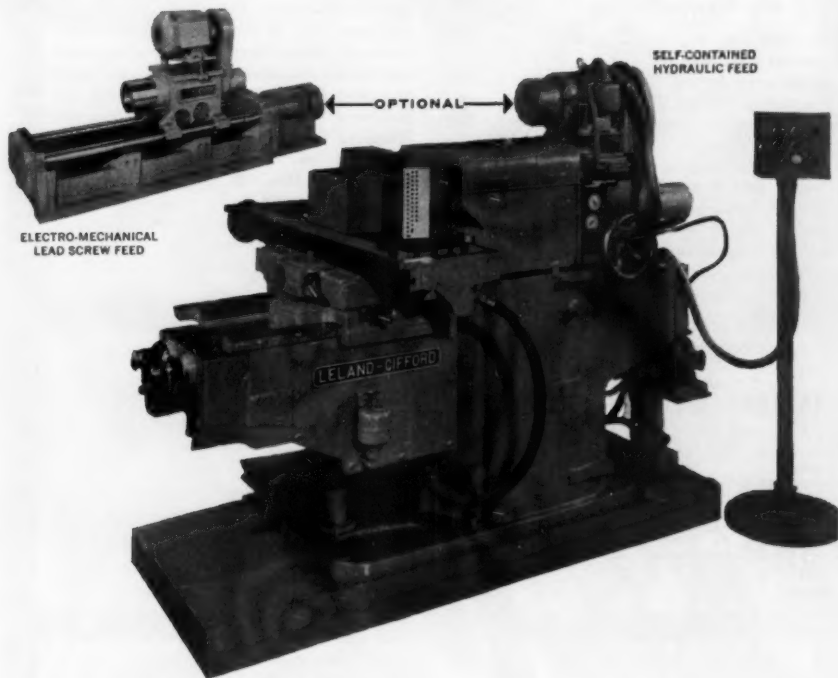
Kelm Mfg. Co.	234
L & J Press Corp.	25
Laminated Shim Co., Inc.	63
Landis Machine Co.	279
Lapeer Mfg. Co.	40, 41
LeBlond Machine Tool Co., R. K.	305
Leland Gifford Co.	211
Lexco Engr. & Mfg. Corp.	266
Linley Bros. Co.	Third Cover
Lodge & Shipley Co.	245
Lucifer Furnaces, Inc.	207
Lyon Metal Products, Inc.	191
M.B.I. Export & Import, Ltd.	48
Macco Products Co.	271
Machine Products Corp.	95
Madison Industries, Inc.	173
Marshall Steel Co.	278
Mastercraft Engr. Co.	58
Mattison Machine Wks.	275
McGonegal Mfg. Co.	228
Mechanical Tool & Engr. Co.	158
Metal Cutting Tools, Inc.	181
Melco, Inc.	286
Mico Development Co., Inc.	166
Micrometrical Mfg. Co.	249
Midwest Tool & Engr. Co.	167
Miller Fluid Power Div., Flick-Reedy Corp.	149
Mimik Tracers, Inc.	156
Minster Machine Co.	299
Mitts & Merrill, Inc.	297
Modern Machine Tool Co.	65
Monarch Machine Tool Co.	43
Moore Special Tool Co., Inc.	23
Morse Twist Drill & Machine Co.	53
National Acme Co.	171
National Twist Drill & Tool Co.	Navan, Subsidiary of
North American Aviation, Inc.	142
Neise, Karl A.	217, 219
Newage Industries, Inc.	248
Newtools, Inc.	290
Nicholson File Co.	121
Nielsen, Inc.	253
Nielsen Tool & Die Co.	234
Norton Co.	29
Numberall Stamp & Tool Co.	147
Nu-Tangs, Inc.	240
OK Tool Co., Inc.	72
Oliver Instrument Co.	14
Olson Industrial Products, Inc.	238
O'Neil-Irwin Mfg. Co.	291
Opto-Metric Tools, Inc.	209
Osborn Mfg. Co.	289
Pannier Corp.	227
Peaslee Metal Products Co.	218

# NEW

LELAND-GIFFORD

## KNEE-TYPE GUN DRILL

- Does High Precision Work
- Handles Many Jobs
- Cuts Fixturing Costs



### AVAILABLE WITH HYDRAULIC OR LEAD SCREW FEED

For gun drilling smooth, round, straight, deep holes up to  $\frac{3}{4}$ " diameter in ferrous or non-ferrous materials, consider the advantages of this Leland-Gifford Universal Gun Drill:

Coordinate elevating, traversing and swiveling of the table eliminates much expensive fixturing. You can handle a wide variety of jobs quickly and

economically.

Available with hydraulic or lead screw feed. Choose the feed unit best for your range of hole diameters and depths.

There are few holes too deep, too small or too accurate to be drilled with this modern, capable gun drilling equipment.

*For complete information, write for detailed bulletin — or ask to have an experienced sales engineer call.*



**LELAND-GIFFORD**  
WORCESTER 1, MASSACHUSETTS

**DRILLING MACHINES**

For more data circle 581 on Postpaid Card

March, 1961

MODERN MACHINE SHOP 305

Pemco Perforators Co. ....	248
Perkins Machine & Gear Co. ....	129
Pines Engr. Co., Inc. ....	198
Pope Mchry. Corp. ....	18
Portage Double-Quick, Inc. ....	307
Porter Machine Co. ....	248
Precision Tool & Mfg. Co. of Ill. ....	231
Procurier Safety Chuck Co. ....	301
Queen City Machine Tool Co. ....	130
R. B. Tool Co., Inc. ....	267
Raymond Mfg. Div., Associated Spring Corp. ....	176
Reed Rolled Thread Die Co. ....	257
Reid Tool Supply Co. ....	210
Relco Mfg. & Sales ....	260
Rice Pump & Machine Co. ....	236
Richards Bros. Punch Div., Allied Products Corp. ....	57
Richards Co., J. A. ....	208
Rockford Engineered Products Co. ....	174
Rockwin Mfg. Co. ....	216
Rothfuss Tool Co. ....	233
Ruthman Mchry. Co. ....	303
Safety Harbor Tool & Mfg. ....	290

## 144 ABRASIVE WHEELS & POINTS

Brand New  
Perfect First  
Quality  
Mounted on 1/4"  
Steel Mandrels

ONLY  
**\$28.50**

Postpaid  
in U.S.A.  
Imported



List value  
**\$93.60**  
Save  
up to  
**\$65.10**

## 72 Abrasive Wheels & Points on 1/4 inch steel mandrels \$26.50

Complete In Handy, Sturdy Container At No Extra Cost  
if after 10 days you are not fully convinced that this  
is the greatest wheel and point value in the industry,  
return the set at no cost or obligation on your part.  
Illustrated Free Catalog on Request

**SCHUPACK SUPPLY CO.** DEPT. MS-35  
7331 Cottage Grove Ave. Chicago 19, Illinois  
For more data circle 582 on Postpaid Card

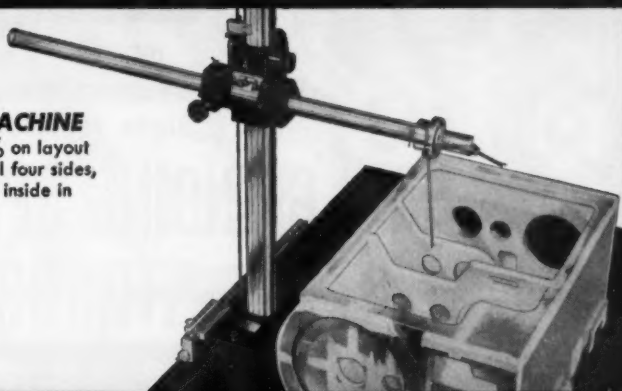
Sales Service Mfg. Co. ....	232
Sanford Mfg. Corp. ....	201
Savage Co., W. J. ....	232
Schupack Supply Co. ....	306
Sentry Co. ....	261
Service Machine Co., Inc. ....	274
Sheffield Corp. ....	61
Sheldon Machine Co., Inc. ....	199
Snap-On Tools Corp. ....	200
Spartan Saw Wks., Inc. ....	229
Spellman Co., R. L. ....	190
Sperman Metal Specialties ....	273
Springfield Machine Tool Co. ....	36
Standard Electrical Tool Co. ....	308
Standard Norse Nail Corp. ....	258
Standard Steel Specialty Co. ....	282
Standard Tool Co. ....	159
Starrett Co., The L. S. ....	39
Stevens Co., John B. ....	250
Stewart Engr. Corp. ....	179
Stueck, Inc., W. Whitney ....	225
Sundstrand Corp. ....	82
Sunnen Products Co. ....	93
Superior Indicator Co. ....	240
Sutton Tool Co. ....	123
Syntron Co. ....	145
Tamms Industries Co. ....	248
Thomson Industries, Inc. ....	31
Thriftmaster Products Corp. ....	26
Tools, Inc. ....	234
Torit Mfg. Co. ....	168
Torrington Co. ....	292
Trico Fuse Mfg. Co. ....	256
Twentieth Century Mfg. Co. ....	231
U. S. Burke Machine Tool Div. ....	163
Universal Engr. Co. ....	60
Vee-Arc Corp. ....	148
Vermont Flexible Tubing Co. ....	252
Victor Mchry. Exchange, Inc. ....	281
Vogel Tool & Die Corp. ....	202
WJZ Gage & Tool Co. ....	206
Wales-Strippit Co. ....	46
Walker Co., Inc., O. S. ....	52
Walton Co. ....	235
Wardwell Mfg. Co. ....	190
Watts Bros. Tool Wks. ....	251
Weldon Tool Co. ....	139
Wells Mfg. Corp. ....	184
Wheelock, Lovejoy & Co. ....	177
Whistler & Sons, Inc., S. B. ....	89
Wiedemann Machine Co. ....	42
Williams & Co., J. H. ....	164, 165
Wilson Co., Inc., K. R. ....	37
Wilson, Inc., Thomas C. ....	152
Wilson Mechanical Instrument Div. ....	69, 161
Winter Bros. Co. ....	170



# P.D.Q. TOOLS PACE INDUSTRY...

## ★ LAYOUT MACHINE

Save up to 80% on layout time. Lays out all four sides, top, bottom and inside in one set up.



## ★ QUICK CHANGE TOOLS

Holders and adapters for every machine use.



## ★ SURE BORE

Micrometer adjusted  
—Carbide Tool Bits,  
Boring Bars and Heads



## ★ END MILL DRIVERS

Cuts Keyways to size with **UNDERSIZE** end mills



## ★ CARBIDE CUT-OFF TOOLS

Available for all automatics, turrets and cut-off machines



## ★ GROOVE CHECKING GAUGE

$\frac{3}{8}$ " to 6" Dia.  
range in one unit  
... quick setting



## ★ MILLING CUTTERS

Carbide inserts—can handle the toughest jobs.

*Literature is available on all tools illustrated*



### PORTAGE Double-Quick TOOL CO.

1041 SWEITZER AVENUE • AKRON 11, OHIO

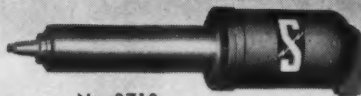
For more data circle 583 on Postpaid Card



No.  
1937

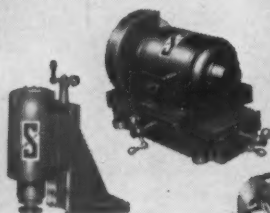


No. 6028



No. 2712

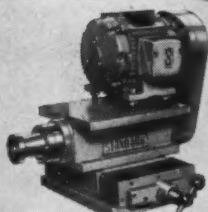
No.  
6004-4A



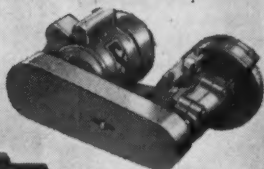
No. 6002-5B



No. 4204

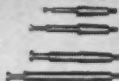


No. 4404-1F



No. BPA

No. 7108



No. 8284

SUPER PRECISION  
**GRINDING SPINDLES**  
By **STANDARD**

**S**pecify rugged, dependable Standard Super Precision Grinding Spindles. The nation's widest line of conventional designs plus custom engineering service.

*"endless versatile variations"*

WRITE FOR CATALOG TODAY!

PRECISION SPINDLE DIVISION

the **STANDARD** electrical tool co.

2487 RIVER ROAD, CINCINNATI 4, OHIO

For more data circle 584 on Postpaid Card

308 MODERN MACHINE SHOP



March, 1961



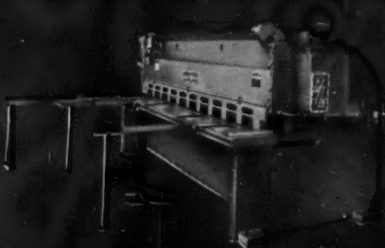
with **Sof-Loc\*** HYDRAULIC HOLDDOWN SYSTEM  
*...GENTLE but POSITIVE*

...exclusive on Lodge & Shipley **POWER SQUARING SHEARS**

Tons of pressure, but applied so gently and quickly... using air for speed, oil for pressure... that's the secret of the exclusive Lodge & Shipley Sof-Loc Holddown. Quietly, without damage to easily marred surfaces, it gives unequalled holding power for fast, "dead accurate" shearing of light sheets or heavy plates.

Sof-Loc is but one of a combination of features you need but won't find on any other shear. These features and the advantages they give are described in a new 20-page catalog of Lodge & Shipley Shears: capacities from 10 gauge to 36" for heavy duty and high production shearing.

Request Bulletin 5347 from: The Lodge & Shipley Co., 3058 Colerain Ave., Cincinnati 26, Ohio.

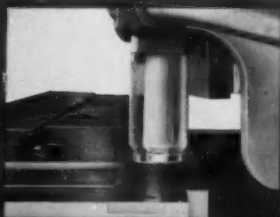


for sheer  
 excellence,  
 choose...

**Lodge & Shipley**

\*PATENTED TRADEMARK REGISTERED

For more data circle 223 on Postpaid Card



Sof-Loc holddowns are available in 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 125, 150, 175, 200, 225, 250, 275, 300, 325, 350, 375, 400, 425, 450, 475, 500, 525, 550, 575, 600, 625, 650, 675, 700, 725, 750, 775, 800, 825, 850, 875, 900, 925, 950, 975, 1000, 1025, 1050, 1075, 1100, 1125, 1150, 1175, 1200, 1225, 1250, 1275, 1300, 1325, 1350, 1375, 1400, 1425, 1450, 1475, 1500, 1525, 1550, 1575, 1600, 1625, 1650, 1675, 1700, 1725, 1750, 1775, 1800, 1825, 1850, 1875, 1900, 1925, 1950, 1975, 2000, 2025, 2050, 2075, 2100, 2125, 2150, 2175, 2200, 2225, 2250, 2275, 2300, 2325, 2350, 2375, 2400, 2425, 2450, 2475, 2500, 2525, 2550, 2575, 2600, 2625, 2650, 2675, 2700, 2725, 2750, 2775, 2800, 2825, 2850, 2875, 2900, 2925, 2950, 2975, 3000, 3025, 3050, 3075, 3100, 3125, 3150, 3175, 3200, 3225, 3250, 3275, 3300, 3325, 3350, 3375, 3400, 3425, 3450, 3475, 3500, 3525, 3550, 3575, 3600, 3625, 3650, 3675, 3700, 3725, 3750, 3775, 3800, 3825, 3850, 3875, 3900, 3925, 3950, 3975, 4000, 4025, 4050, 4075, 4100, 4125, 4150, 4175, 4200, 4225, 4250, 4275, 4300, 4325, 4350, 4375, 4400, 4425, 4450, 4475, 4500, 4525, 4550, 4575, 4600, 4625, 4650, 4675, 4700, 4725, 4750, 4775, 4800, 4825, 4850, 4875, 4900, 4925, 4950, 4975, 5000, 5025, 5050, 5075, 5100, 5125, 5150, 5175, 5200, 5225, 5250, 5275, 5300, 5325, 5350, 5375, 5400, 5425, 5450, 5475, 5500, 5525, 5550, 5575, 5600, 5625, 5650, 5675, 5700, 5725, 5750, 5775, 5800, 5825, 5850, 5875, 5900, 5925, 5950, 5975, 6000, 6025, 6050, 6075, 6100, 6125, 6150, 6175, 6200, 6225, 6250, 6275, 6300, 6325, 6350, 6375, 6400, 6425, 6450, 6475, 6500, 6525, 6550, 6575, 6600, 6625, 6650, 6675, 6700, 6725, 6750, 6775, 6800, 6825, 6850, 6875, 6900, 6925, 6950, 6975, 7000, 7025, 7050, 7075, 7100, 7125, 7150, 7175, 7200, 7225, 7250, 7275, 7300, 7325, 7350, 7375, 7400, 7425, 7450, 7475, 7500, 7525, 7550, 7575, 7600, 7625, 7650, 7675, 7700, 7725, 7750, 7775, 7800, 7825, 7850, 7875, 7900, 7925, 7950, 7975, 8000, 8025, 8050, 8075, 8100, 8125, 8150, 8175, 8200, 8225, 8250, 8275, 8300, 8325, 8350, 8375, 8400, 8425, 8450, 8475, 8500, 8525, 8550, 8575, 8600, 8625, 8650, 8675, 8700, 8725, 8750, 8775, 8800, 8825, 8850, 8875, 8900, 8925, 8950, 8975, 9000, 9025, 9050, 9075, 9100, 9125, 9150, 9175, 9200, 9225, 9250, 9275, 9300, 9325, 9350, 9375, 9400, 9425, 9450, 9475, 9500, 9525, 9550, 9575, 9600, 9625, 9650, 9675, 9700, 9725, 9750, 9775, 9800, 9825, 9850, 9875, 9900, 9925, 9950, 9975, 10000.



Strong, aluminum, no damage to easily-marred material.

**Think Service . . .**



**HOLO-KROME REPRESENTATIVES ARE READY TO HELP YOU  
DESIGN AND MANUFACTURE FOR GREATER PROFIT**

To take advantage of the special knowledge that's available to you, call a Holo-Krome representative. He's an expert on top-quality THERMO-FORGED\* socket screws and is skilled in all phases of applying them. He'll help you design the best fastener into your product in a way that will keep manufacturing costs at a minimum.

Application assistance, same-day service and cost-reducing quality make Holo-Krome THERMO-FORGED

socket screws your best fastener buy. Like full details on how Holo-Krome quality and service can help increase your profit? See your authorized Holo-Krome distributor, or write for more information.

**HOLO-KROME**  
*Thermo-Forged\**  
**SOCKET SCREWS**

SOLD ONLY THROUGH AUTHORIZED HOLO-KROME DISTRIBUTORS  
THE HOLO-KROME SCREW CORPORATION • HARTFORD 10, CONN.



\*Trade Mark of The Holo-Krome Screw Corporation

**For more data circle 304 on Postpaid Card**

